Detailed Procedure for setting up a current regulator cards for the RHIC IR Power Supplies, Snakes, Rotators, Gamma-T's & AGS Cold Snake Power Supplies

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Detailed Procedure for setting up a current regulator card for the RHIC IR Power Supplies & the Snakes, Rotators, and Gamma-T Power Supplies

1. Determine the sitewide name of the power supply the current regulator card is part of and write it down AND write down what service building this power supply is in.

2. Use the middle term of the sitewide name to determine what current regulator card you will need to set up. For example, if the sitewide name of the p.s. is "bi1-qf1-ps" then the middle term of the sitewide name is "qf1" so you will need to set up a current regulator card for a "qf1" power supply.

3. Now you should look for the time constant sheet which contains the middle term of the sitewide name you are interested in. For example, if you want to set up a current regulator card for a "qf1" power supply you should find the time constant sheet that has a "qf1" in its sheet name. It is ok if the sheet says "qf1/qd1", this means the time constant on the sheet is good for a qf1 or a qd1. The Time Constant sheets can be found on the web at http://www.c-ad.bnl.gov/ceps/IR%20Supplies.htm then look for the link called "Current regulator Time Constant setup" and select it. You will also find the time constant sheets attached to this document.

4. Once you find the correct time constant sheet you must make sure the time constant sheet is for the building your power supply is in. If the sheet says "For ALL Service buildings" then that means the sheet is good for all service buildings. Some sheets may say "For service building 1010A only" which means the time constant on that sheet is good only for service building 1010A.

5. Once you have determined that you have the correct time constant sheet for the correct building you can set up the time constant board which is a little daughter board that plugs into the main current regulator board.

6. There are spare time constant daughter boards in the 1007W spares locker sitting in little drawers that are labeled. Find the one that you need and make sure it matches the time constant sheet. On the time constant sheet you will see the daughter board outlined in a rectangular shaped dotted line.

7. If the time constant sheet you have found matched the one on the sheet then the next step is to set up the jumpers on the time constant board correctly. The time constant sheet has jumper settings for the time constant board. Since you are most likely running with a magnet load you want to select the jumper settings called "inductive load jumper settings". Go ahead and set up the jumpers. The jumpers are also in the 1007W spares locker.

8. If for some reason you cannot find a time constant board that matches the one you need then you will then have to make one. If you need to make one you can find the collider electrical power supplies tech shop in 911-A. They are stored in the back room and should be in bin #20. There are 2 types of TC boards so make sure you take the correct one. You can use standard 1/4 watt resistors, they do not need to be precision resistors. You will need to use special 3.3uF capacitors for the time constant board which are located in the collider electrical power supplies tech shop in 911-A. If you enter through the back door they are in the first cabinet on the right hand side. These special capacitors are yellow on the front and back and silver on the sides with two silver colored leads soldered to the sides.

9. If you are making a time constant board you can use the time constant board schematic in the rectangular dotted line on the time constant sheet to tell you what components you need. Using the "qf1/qd1" time constant sheet as an example this is what you would do. R2 does not get a resistor, it is left empty. R3=2k. C1-C9 = 30uF means that a 3.3uF capacitor must be soldered into C1 and C2 and C3 and C4 and C5 and C6 and C7 and C8 and C9. All of these capacitors are in parallel for a total of 29.7uF or about 30uF. There are no capacitors soldered into C13-C24, these are left empty. R3=2k and R4=3.9K.

10. Now that the time constant board is set up you need to find a current regulator main board. These are also in the 1007W spares locker. They are all labeled. If you find a current regulator card that matches the type you need you can use it. If you cannot find a current regulator card with the type you need then you will have to make one. Use TABLE I to determine which current regulator main boards cards are interchangeable.

TABLE I   Current Regulator Main Board Types:

Type 1	Type 2	*Type 3	Type 4	Type 5	Type 6	Type 7	Type 8	Type 9	Type 10
tq	qf1/qd1	qf6	qf7	qtrim	blue dh0 that is not in 1010A	qgt (these are gamma-t p.s.'s in alcoves)	q89	snk7 (in alcoves)	A20-csnk-ps (in A18 in AGS)
qf2/qd2	qf3/qd3	qd6	qd7				qd9	rot3 (in alcoves)	A20-csnk-sol-ps (in A18 in AGS)
	qf8/qf9	q6	q7						
	yellow dh0								
	blue dhx								
	blue dh0 in 1010A only								

*note: bo3-qf6 and yo4-qf6 are different main boards – see sheets that follow in Time Constant sheet section

Other Notes:

a. A Type 9 board main board is the same as a Type 1 main board except that the error adjust on a Type 9 is set to 0.75V and the error delay on a Type 9 main board is set to 1.67V. On a type 1 main board the error adjust is set to 1.25V and the error delay is set to 3.7V.

b. To make a Type 2 main board from a Type 1 main board just remove E45-E48.

c. To make a Type 1 main board from a Type 2 main board install a jumper for E45-E48.

11. There are 10 types of current regulator main boards. Type 1 is for the suncraft power supplies (listed). Types 2-6 are for the dynapower power supplies. Type 7 is for the Gamma-T power supplies in the alcoves. Type 8 is for the suncraft q89 and qd9 power supplies only. Type 9 is for the RHIC snake and rotator p.s.'s. The RHIC snake and rotators are in the alcoves. Type 10 is for the AGS Cold Snake p.s.'s. The AGS Cold Snakep.s.'s are in the A18 house. There should be at least one of each type of these current regulator main boards in the spares locker. When you find one that matches your type then you can interchange it with any other power supply that is the same type. For example, if you find a current regulator main board labeled "Type 1" then you can use that main board for a tq or a qf2 or qd2 but you cannot use it for a qf6 or qd6 because a qf6 or qd6 is a different type.

12. Now that you have found a main board you should do some checks to make sure the main board is set up correctly.

13. For the current regulator main board you are interested in you should go to the time constant sheets and see if there are any main board changes. If you look towards the bottom middle of the time constant sheet look for the words "see main board changes". If you see these words that means there are main board changes and they are usually have circles or ellipses around them. Check that your main board has these changes on it. If the time constant sheet does not say there are any main board changes then there are none. You can check that the board you have matches the components around op-amps U3 and U4 and U5 anyway by comparing the time constant sheet with the main board.

14. The next thing you must do is set up the jumpers correctly on the current regulator main board. If your main board is a Type 1, Type 7, Type 8, Type 9 or Type 10 then set up the jumpers on the main board so they look like the jumper settings in TABLE II:

TABLE II
Type 1, Type 7, Type 8, Type 9 or Type 10 Current Regulator card main board jumper settings

E5 to E6 in
E42 to E44 in
E45 to E48 in
E47 to E46 out

15. If your main board is a Type 2, 3, 4, 5 or 6 then set up the jumpers on the main board so they look like the jumper settings in TABLE III:

TABLE III
Type 2, 3, 4, 5, or 6 Current Regulator card main board jumper settings

E5 to E6 in
E42 to E44 in
E45 to E48 out
E47 to E46 out

16. Now that the jumpers have been set up correctly on the current regulator main board there is one more check which must be made. All of the boards should have a long jumper wire on the rear (or front) of the board from pin 26C of the 64 pin DIN connector to relay K3-1. Types 2-6 current regulator main boards are the only boards that really need this wire but we installed the wire on all. You can find a schematic attached to the time constant sheets that shows the jumper wire and where it gets connected to. It is called **"jumper wire connection sheet for types 2-6 current regulator main boards"**. If the jumper wire is not on the rear (or front) of the board it must be installed. You can just solder the wire onto the two points on the rear (or front) of the board. Some new boards may have a land connecting these two points so you should ring these two points out with a meter. If it reads open then you need to install this jumper wire.

17. Only a Type 1, Type 7, Type 8, or Type 9 or Type 10 current regulator card will work with the wire installed or not installed on the rear (or front) of the board. This is because the jumper settings on the current regulator main board are different for the a Type 1, Type 7, Type 8, Type 9 or Type 10 vs Types 2-6. Type 2-6 current regulator main board must have the jumper wire installed on the rear of the board or you will not be able to clear the error fault.

18. With the power supply in the OFF state you can now plug your time constant board into your current regulator main board and plug the complete current regulator card into the power supply. MAKE SURE ALL OF THE PINS OF THE TIME CONSTANT BOARD PLUG INTO THE CURRENT REGULATOR MAIN BOARD OR YOU CAN DAMAGE THE POWER SUPPLY!!!

19. After you plug the current regulator card into the power supply you put the power supply into STANDBY and you now need to set the error adjust and error delay. For types 1-8 and Type 10 set the error adjust to 1.25V and the error delay to 3.7V. For a type 9 set the error adjust to 0.75V and the error delay to 1.67 V. You can do this by measuring error adjust testpoint on the front panel and the error delay testpoint on the front panel and use the common testpoint as your common for both the error adjust testpoint and the error delay testpoint. There are two pots at the top labeled error adjust and error delay adjust. These are the pots you will adjust. When you are done make sure the power supply is in REMOTE STANDBY and hand it back over to MCR.

Current Regulator Card Setup Quick Checklist
Refer to the detailed procedure if you need more information. The Detailed Procedure
can be found on the web at http://www.c-ad.bnl.gov/ceps/IR%20Supplies.htm then look
for the link called "Current regulator Time Constant setup" and select it.

1. What is sitewide name of p.s. and building p.s. is in? Write down
here:_____

2. Find the Time Constant sheet that contains the middle term of p.s. sitewide name in the
"Current regulator Time Constant setup" procedure.

3. Find the Time Constant daughter board in 1007W spares locker in the little drawers.

4. Make sure the jumpers on the Time Constant daughter board match the time constant
sheet jumper settings for INDUCTIVE LOAD since you are connected to the magnets.

5. Find the current regulator main board that you need. There are 10 types of current
regulator main boards. TABLE I below shows which current regulator main boards can
be interchanged.

SEE NEXT PAGE:

TABLE I   Current Regulator Main Board Types:

Type 1	Type 2	*Type 3	Type 4	Type 5	Type 6	Type 7	Type 8	Type 9	Type 10
tq	qf1/qd1	qf6	qf7	qtrim	blue dh0 that is not in 1010A	qgt (these are gamma-t p.s.'s in alcoves)	q89	snk7 (in alcoves)	A20-csnk-ps (in A18 in AGS)
qf2/qd2	qf3/qd3	qd6	qd7				qd9	rot3 (in alcoves)	A20-csnk-sol-ps (in A18 in AGS)
	qf8/qf9	q6	q7						
	yellow dh0								
	blue dhx								
	blue dh0 in 1010A only								

*note: bo3-qf6 and yo4-qf6 are different main boards – see sheets that follow in Time Constant sheet section

Other Notes:

d. A Type 9 board main board is the same as a Type 1 main board except that the error adjust on a Type 9 is set to 0.75V and the error delay on a Type 9 main board is set to 1.67V. On a type 1 main board the error adjust is set to 1.25V and the error delay is set to 3.7V.

e. To make a Type 2 main board from a Type 1 main board just remove E45-E48.

a. To make a Type 1 main board from a Type 2 main board install a jumper for E45-E48.

6. Determine what type of current regulator main board you have by looking at the front of the card or by looking at TABLE I above. Find the middle term of the sitewide name you are interested in on Table 1. After you know which type of current regulator main board you have then look for any current regulator main board in the 1007W spares locker that is the same as your type. All the current regulator main boards have the Type numbers on the front of them.

7. If you find you need a type 2-6 current regulator main board then make sure the spare board you find has a jumper wire on the rear of the board from K3-1 to the 64 pin DIN connector 26C. If there is no wire then you should ring out these two points to make sure there is a land connecting them. If these two points are not connected then refer to the detailed procedure for connecting them.

8. Set up the jumpers correctly on the current regulator main boards. Set up the jumper settings on the main boards according to one of the following two tables, TABLE II OR TABLE III:

TABLE II
Type 1, Type 7, Type 8, Type 9 or Type 10 Current Regulator card main board jumper settings

E5 to E6 in
E42 to E44 in
E45 to E48 in
E47 to E46 out

TABLE III
Type 2, 3, 4, 5, or 6 Current Regulator card main board jumper settings

E5 to E6 in
E42 to E44 in
E45 to E48 out
E47 to E46 out

9. You can now plug your time constant board into your current regulator main board and plug the complete current regulator card into the power supply. MAKE SURE ALL OF THE PINS OF THE TIME CONSTANT BOARD PLUG INTO THE CURRENT REGULATOR MAIN BOARD OR YOU CAN DAMAGE THE POWER SUPPLY!!!

SEE NEXT PAGE!!!

10. After you plug the current regulator card into the power supply you put the power supply into STANDBY and you now need to set the error adjust and error delay. For types 1-8 and Type 10 set the error adjust to 1.25V and the error delay to 3.7V. For a type 9 set the error adjust to 0.75V and the error delay to 1.67 V. You can do this by measuring error adjust testpoint on the front panel and the error delay testpoint on the front panel and use the common testpoint as your common for both the error adjust testpoint and the error delay testpoint. There are two pots at the top labeled error adjust and error delay adjust. These are the pots you will adjust. When you are done make sure the power supply is in REMOTE STANDBY and hand it back over to MCR.

Magnet Power Supplies	Resistive Load	Inductive Load
Qd3,Qf3	2 pin jumper from E2-E3 2 pin jumper from E9-E10 2 pin jumper from E6-E7	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7
Blue dhx	2 pin jumper from E2-E3 2 pin jumper from E9-E10 2 pin jumper from E6-E7	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7
Blue dh0 (except 1010A)	2 pin jumper from E2-E3 2 pin jumper from E9-E10 2 pin jumper from E6-E7	2 pin jumper from E1-E2 2 pin jumper from E6-E7
Blue dh0 (1010A only)	2 pin jumper from E2-E3 2 pin jumper from E9-E10 2 pin jumper from E6-E7	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7
Yellow dh0	2 pin jumper from E2-E3 2 pin jumper from E9-E10 2 pin jumper from E6-E7	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7
Q6 in 2b, 6b, 8b or 12A	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7	2 pin jumper from E1-E2 2 pin jumper from E9-E10
Bi4-qd6 or yi3-qd6 in 1004B or 1010A qd6 or qf6	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7
Bo3-qf6 or yo4-qf6 in 1004B only	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7
Qtrims (only exist in 1004B)	2 pin jumper from E2-E3 2 pin jumper from E9-E10 2 pin jumper from E6-E7	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7
Qf1,Qd1	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7
Qf8,Qf9	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7
Qf7Qd7/Q7	2 pin jumper from E7-E8 2 pin jumper from E1-E2	2 pin jumper from E1-E2 2 pin jumper from E9-E10
TQ's	2 pin jumper from E2-E3	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7
Qd2,qf2	2 pin jumper from E1-E2 2 pin jumper from E7-E8	2 pin jumper from E1-E2 2 pin jumper from E9-E10 2 pin jumper from E6-E7
Q89,qd9	2 pin jumper from E1-E2 2 pin jumper E7-E8 *use different TC card in resistive time constant section of this procedure*	2 pin jumper from E2-E3 2 pin jumper from E6-E7 *use inductive TC card*
Snk7, rot3	4 pin jumper from E1-E4 *see R Load 1 TC sheet*	See below
Snk7, rot3	2 pin jumper from E2-E3 2 pin jumper from E6-E7 2 pin jumper from E9-E10 *see R Load 2 TC sheet*	2 pin jumper from E2-E3 2 pin jumper from E6-E7 2 pin jumper from E9-E10 *use inductive TC card*
Csnk (Helical) (in A18 house)	See R Load section for TC sheet (R load tc card ≠ L load tc card)	See L load section for TC Sheet R load tc card ≠ L load tc card
Csnk-sol (Solenoid)(in A18 house)	See R Load section for TC sheet (R load tc card ≠ L load tc card)	See L load section for TC Sheet (R load tc card ≠ L load tc card)

TIME CONSTANT SHEET

BLUE and YELLOW qf1/qd1 power supplies

For ALL Service buildings

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
Resistive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.
Inductive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.

Time Constant Board in dotted line

qf1qd1.skf
12/5/2001

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TIME CONSTANT SHEET

BLUE and YELLOW qf2/qd2 power supplies

For ALL Service buildings

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
Resistive Load Jumper settings = E1-E2 in, and E7-E8 in.
Inductive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.

Time Constant Board in dotted line

E2 E3

E8 E7

E1 E4 E5

E10 E9 E6

C13-C24
39.6uF

R3
2k

R4
2k

R2
empty

R1
10k

C1-C9
29.7uF

E28 E29

R13
100k

J2-2

J2-1

J2-5

J2-6

E10 E11

E22 E23

E30 E31

R3
1M

R10
200k

E21

R9 empty

E9

E12 E13

E24 E25

C18
0.01uF

E20

E26 E27

C5
.0.01uF

E14 E15

C12
.0.01uF

JU5

R6
10k

R11
10k

JU3

JU4

E8

E16 E17 E18 E19

R7
empty

C11
.0.1uF

qf2qd2.skf
12/5/2001

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TIME CONSTANT SHEET

BLUE and YELLOW qf3/qd3 power supplies

For ALL Service buildings

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)

Resistive Load Jumper settings = E6-E7 in, E9-E10 in, and E2-E3 in.
Inductive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.

Time Constant Board in dotted line

E2   E3

E8   E7

E10   E9   E6

E1   E4   E5

R2
empty
R1
10k
C1-C9
29.7uF

C13-C24
empty
R3
2k
R4
3.9k

E28   E29

R13
100k

J2-5   J2-6

E22   E23

E30   E31

J2-2   E10   E11   J2-1

R3
1M

E21

R10
200k

E9 empty

C18
0.01uF

E9

R2 empty

E12   E13

E20   E24   E25

E26   E27

E8

C5
0.01uF

E14   E15

R6
10k

C12
0.01uF

U4

R11
10k

U5

U3

E16   E17   E18   E19

C11
0.1uF

R7
empty

qf3qd3.skf
12/5/2001

Q6 Current Regulator Card Replacement Procedure (see Time constant sheets that follow)

If the Q6 Current Regulator card is in 1002B, 1006B, 1008B or 1012A
1. Find a current regulator main board that is labeled **Type 3**
2. Find a Time Constant Daughter Board labeled **Q6** in the top of the spares locker.
3. Put these together and swap out the card and Time constant
4. If you cannot find the time constant then remove the one that is on the existing board and use it.

If the qd6 or qf6 current regulator card is in 1010A
1. Find a current regulator main board that is labeled **Type 3**
2. Find a Time Constant Daughter Board labeled **10A or 4B Q6 only** in the top of the spares locker.
3. Put these together and swap out the card and time constant.
4. If you cannot find the time constant then remove the one that is on the existing board and use it.

If the qd6 or qf6 current regulator card is in 1004B and is named bi4-qd6 or yi3-qd6
1. Find a current regulator main board that is labeled **Type 3**
2. Find a Time Constant Daughter Board labeled **10A or 4B Q6 only** in the top of the spares locker.
3. Put these together and swap out the card and time constant.
4. If you cannot find the time constant then remove the one that is on the existing board and use it.

If the qd6 or qf6 current regulator card is in 1004B and is named bo3-qf6 or yo4-qf6
1. Find a current regulator main board that is labeled **bo3-qf6 or yo4-qf6.**
2. This current regulator card will have the time constant on it already.
3. Swap out the card and time constant.

TIME CONSTANT SHEET

BLUE and YELLOW q6 power supplies

Buildings 1002B, 1006B, 1008B and 1012A
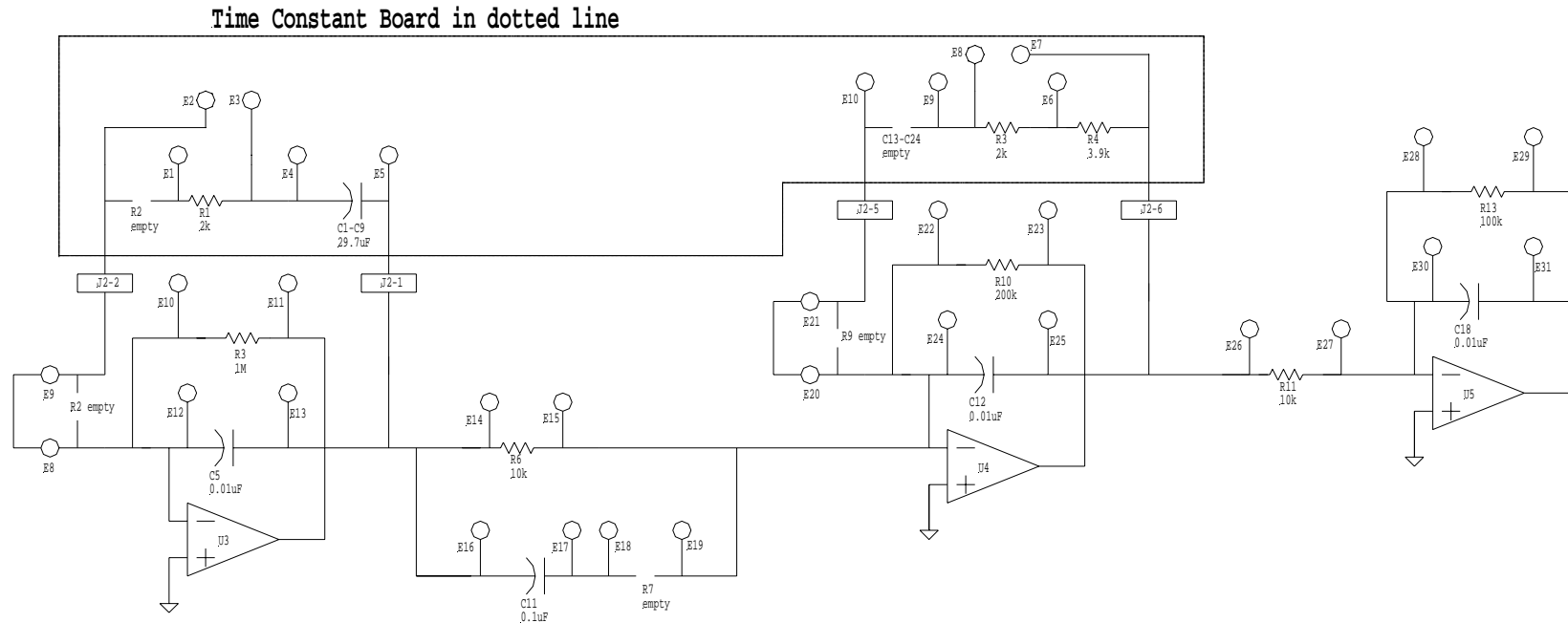
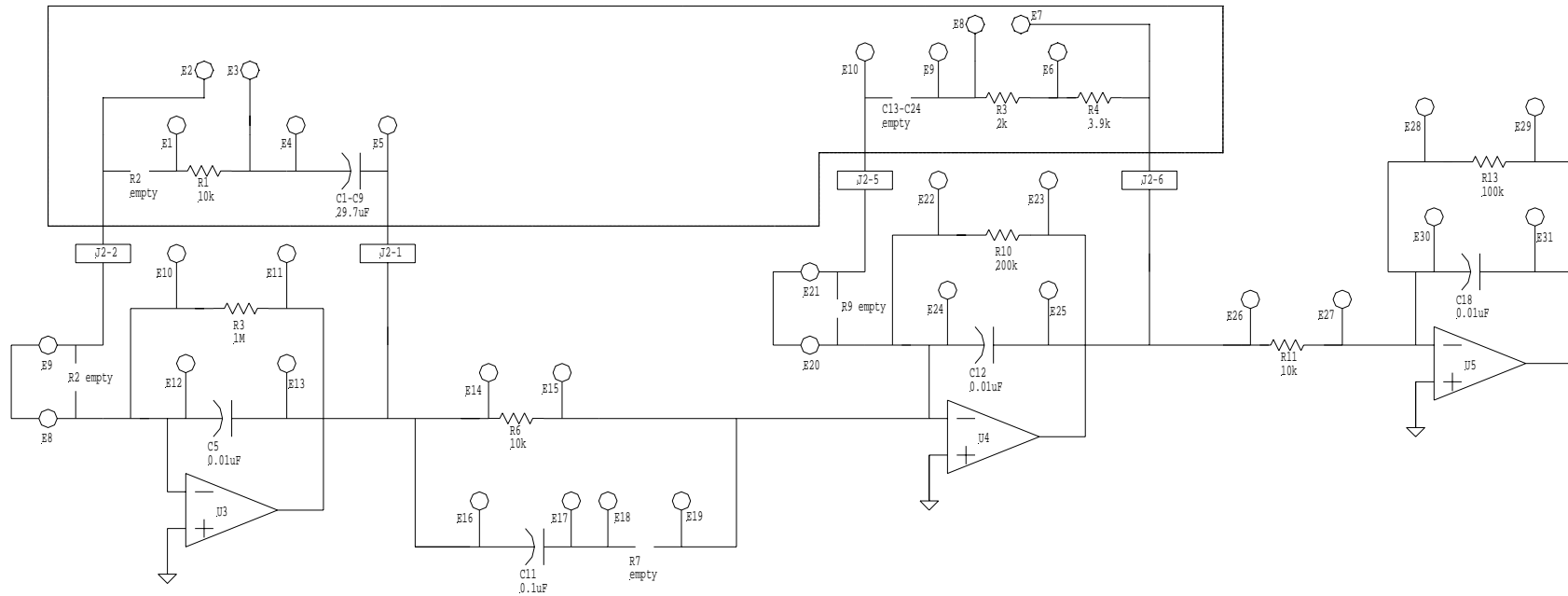## New Time Constant first used during the Polarized Proton Run of 2003

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)

Resistive Load Jumper settings = E1-E2 in, E6-E7 in and E9-E10 in.

Inductive Load Jumper settings = E1-E2 in, and E9-E10 in.

Time Constant Board in dotted line

SPECIAL!!
USE NEW DOUBLE DECKER TIME
CONSTANT BOARD
Top board caps=C1-C12 in
Bottom Board caps=C1-C24 in

E2 E3
E1 E4 E5
R2 empty   R1 5.1K   .118.8uF

E8 E7
E10 E9 E6
C13-C24 empty   R3 22k   R4 39k
J2-5
E22 E23
R10 200k
E21 E24 E25
R9 empty
E20 C12 .01uF
J2-6

510 1.0u
E28 R13 .510k E29
510k
E30 E31
C18 .01uF

J2-2 J2-1
E10 E11
R3 1M
E9
R2 empty
E12 E13
E8
C5 .01uF
U3

E14 E15
R6 10k
E16 E17 E18 E19
C11 2uF
.(2 105'S IN parallel)
R7 1k

U4
R11 100k
E26 E27
U5

C11 19.8uF   R7 10k
use 4-4.7uF in parallel
and then a 1uF in parallel with that

q6Test8for2_6_8_12A.skf
3/21/05

See Main Board Changes in Ellipses

TIME CONSTANT SHEET

BLUE and YELLOW qd6 & qf6 power supplies

Building 1010A or bi4-qd6 or yi3-qd6 in 1004B

New Time Constant first used during the Polarized Proton Run of 2003

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
Resistive Load Jumper settings = E1-E2 in, E6-E7 in and E9-E10 in.
Inductive Load Jumper settings = E1-E2 in, E6-E7 in and E9-E10 in.

Time Constant Board in dotted line

E2 E3

E1   R4   E5

R2
empty   R1
5.1K   .118.8uF

SPECIAL!!
USE NEW DOUBLE DECKER TIME
CONSTANT BOARD
Top Board Caps=C1-C12
Bottom Board Caps=C1-C24

E8 E7

E10   E9   E6

C13-C24   R3   R4
empty   22k   39k

J2-5   E22   E23   J2-6

R10
200k

J2-2   J2-1

E10   E11   E21   E24   E25

R3
1M   R9 empty

E9   E20

R2 empty   E12   E13   E14   E15   C12
.0.01uF

E8   C5
0.01uF   R6
10k

IJ3   R11
100k   E26   E27

IJ4   IJ5

E16   E17 E18   E19

C11
2uF
(2 105'S IN parallel)   R7
1k

510   1.0u

E28   R13   E29
510k
510k

E30   E31

C18
0.01uF

C11
19.8uF   R7
10k

use 4-4.7uF in parallel
and then a 1uF in parallel with that

q6Test8for10Aorbi4_qd6orYi3_qd6.skf
3/21/05

See Main Board Changes in Ellipses

TIME CONSTANT SHEET

BLUE and YELLOW qf6 power supplies
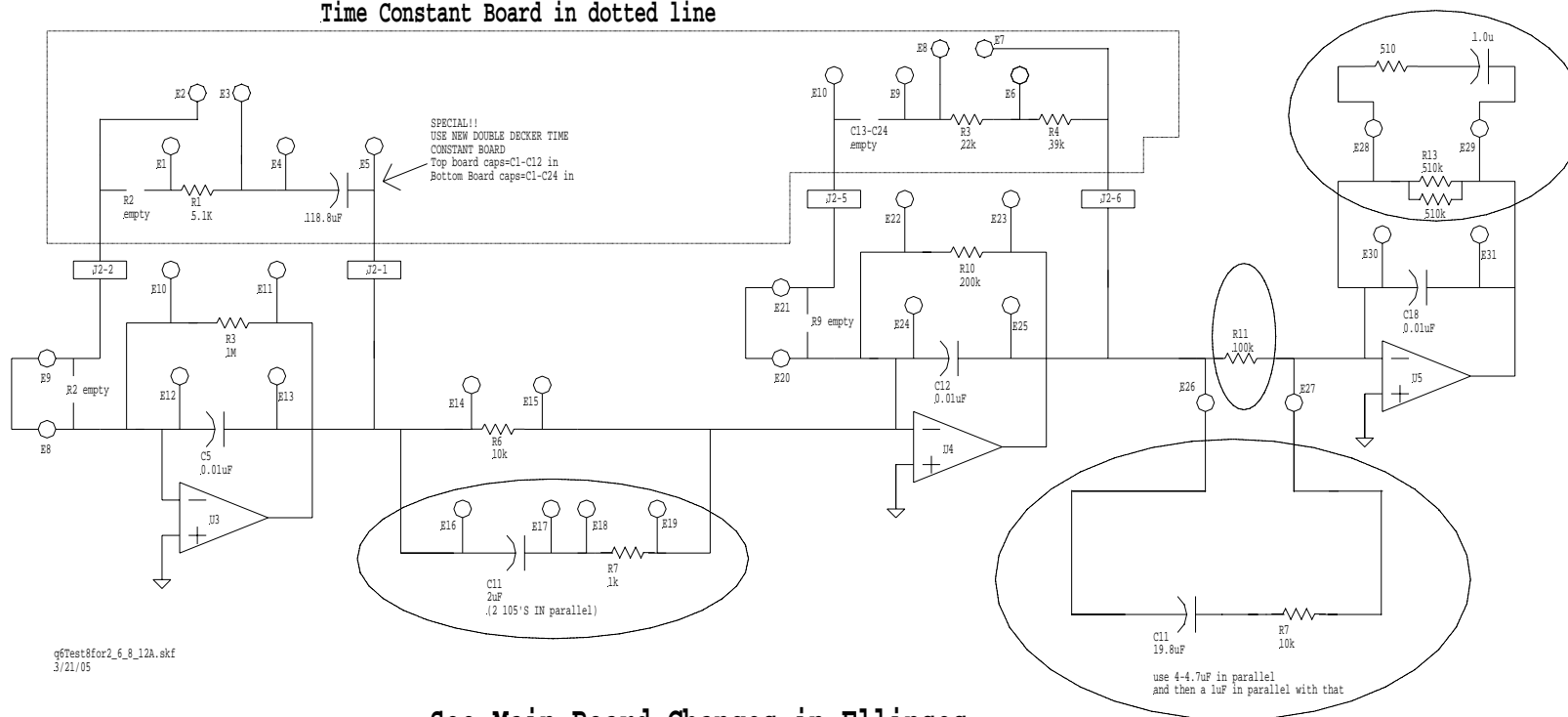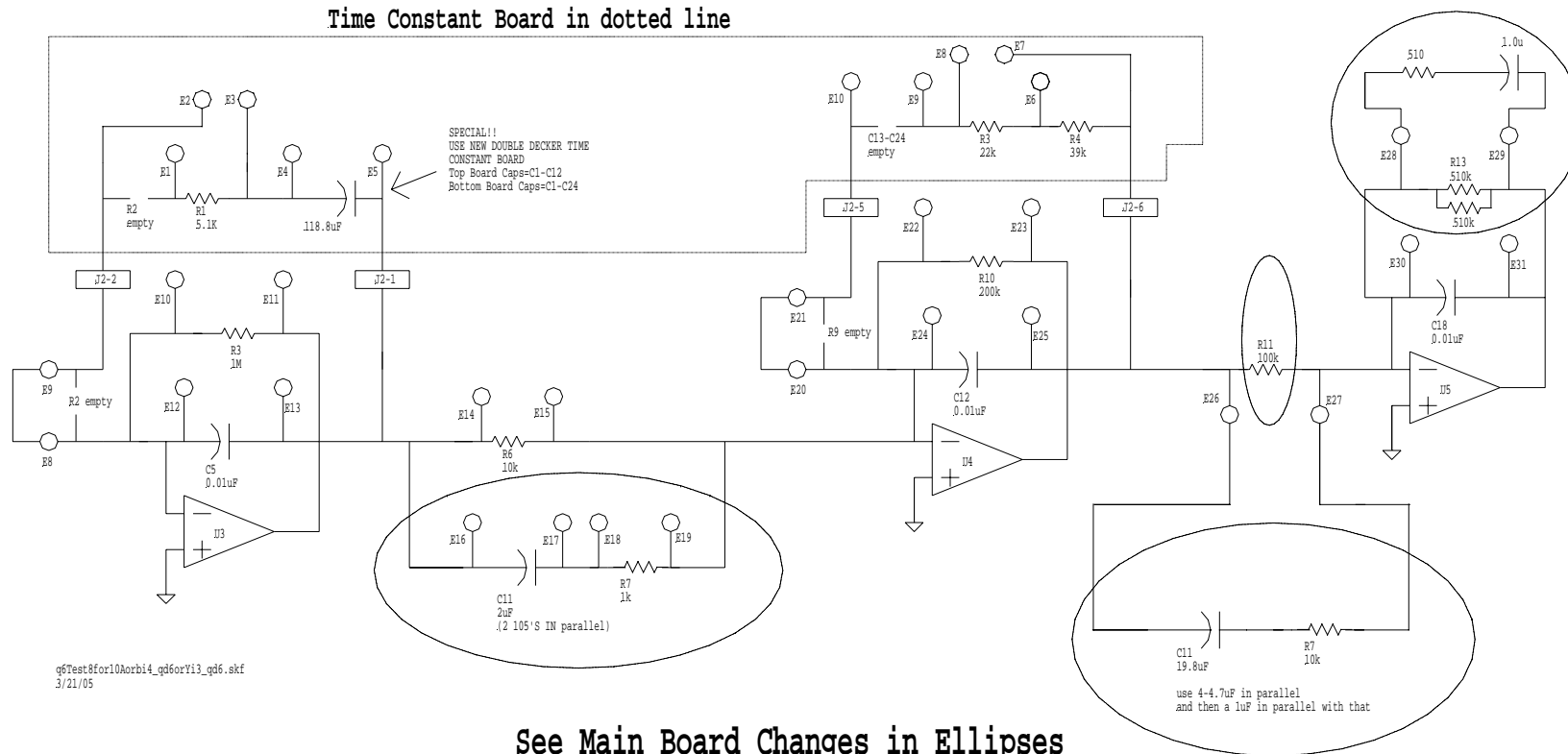
This is for bo3-qf6 and yo4-qf6 ONLY

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)

Resistive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.
Inductive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.

Time Constant Board in dotted line

SPECIAL!!
USE NEW DOUBLE DECKER TIME
CONSTANT BOARD
Top Board Caps=C1-C12 in
Bottom Board=C1-C24

See Main Board Changes in Ellipses

q6Forbo3_qf6oryo4-qf6.skf
3/21/05
This is the same as the file q6original.skf

19

TIME CONSTANT SHEET

> BLUE and YELLOW q7 power supplies

For ALL Service Buildings

New Time Constant first used during the Polarized Proton Run of 2003
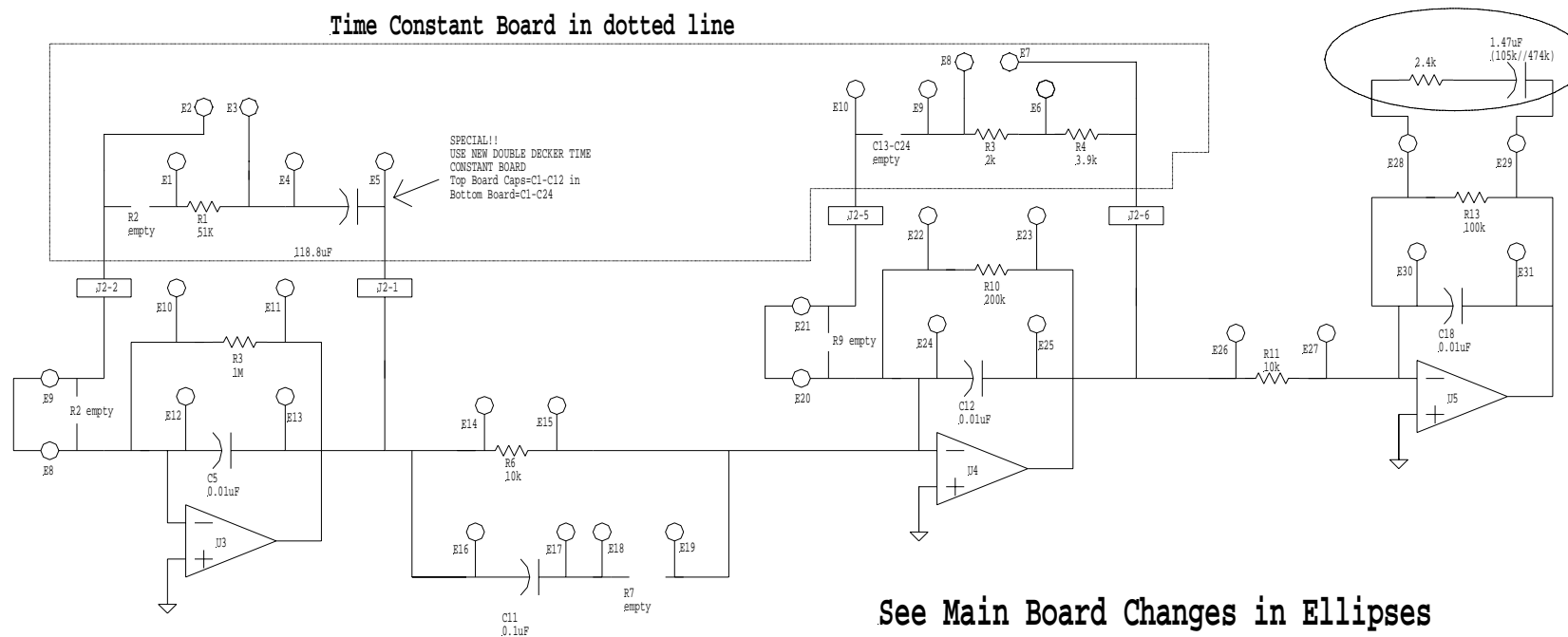
Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)

Resistive Load Jumper settings = E1-E2 in, and E7-E8 in.

Inductive Load Jumper settings = E1-E2 in, E9-E10in.

Time Constant Board in dotted line

SPECIAL!!
USE NEW DOUBLE DECKER TIME
CONSTANT BOARD
Top Board Caps=C1-C12
Bottom Board Caps=C1-C24

See Main Board Changes in Ellipses!

q7test5cir.skf
3/21/05

TIME CONSTANT SHEET

BLUE and YELLOW qf8/qf9 power supplies
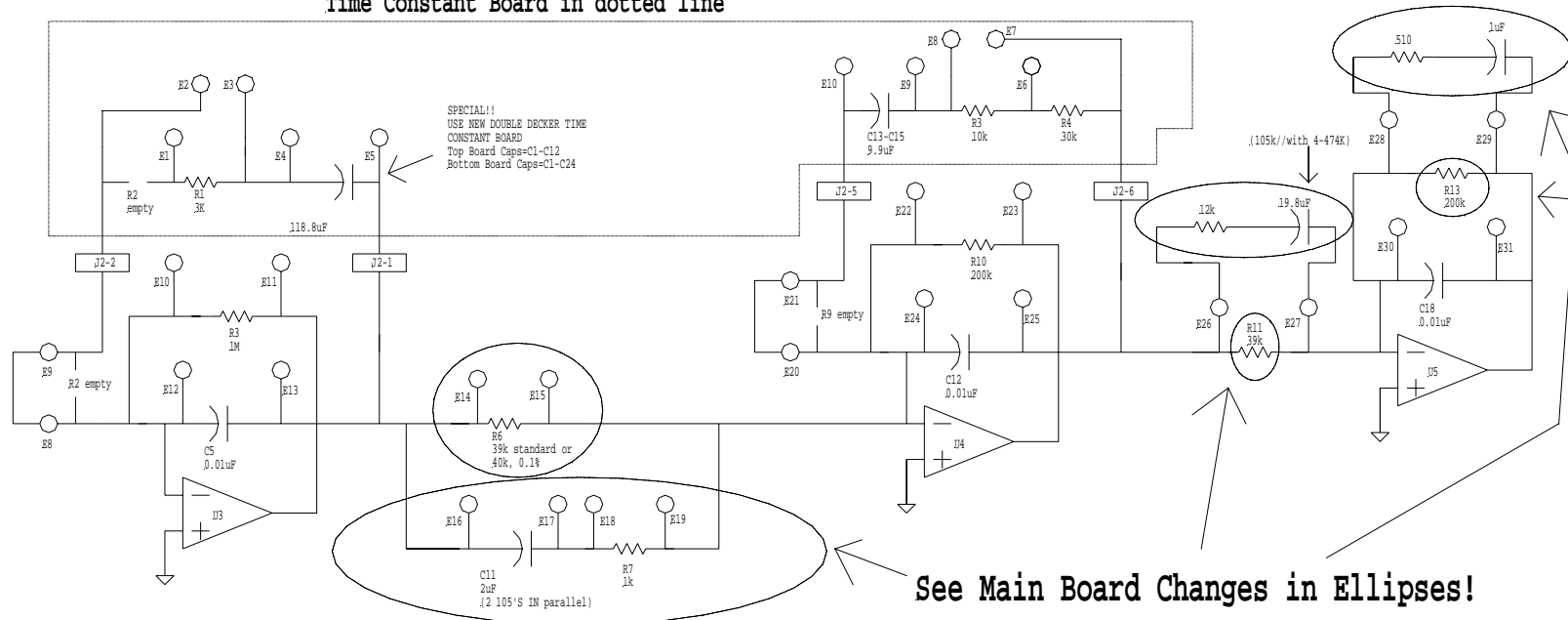
For ALL Service buildings

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
Resistive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.
Inductive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.

Time Constant Board in dotted line

qf8qf9.skf
12/5/2001

TIME CONSTANT SHEET

BLUE and YELLOW q89 & qd9 power supplies

FOR ALL SERVICE BUILDINGS

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
Resistive Load Jumper settings = see TC card in resistive load section
of this procedure.
Inductive Load Jumper settings = E2-E3 in and E6-E7 in.

Time Constant Board in dotted line

SEE MAIN BOARD CHANGE!!!

Allq89qd9x9x29x03.skf
9/29/03

TIME CONSTANT SHEET

BLUE and YELLOW QTRIM power supplies

The QTRIM's are located only in 1004B.
They are Dynapower p.s.'s.
They are 40V at 300A.
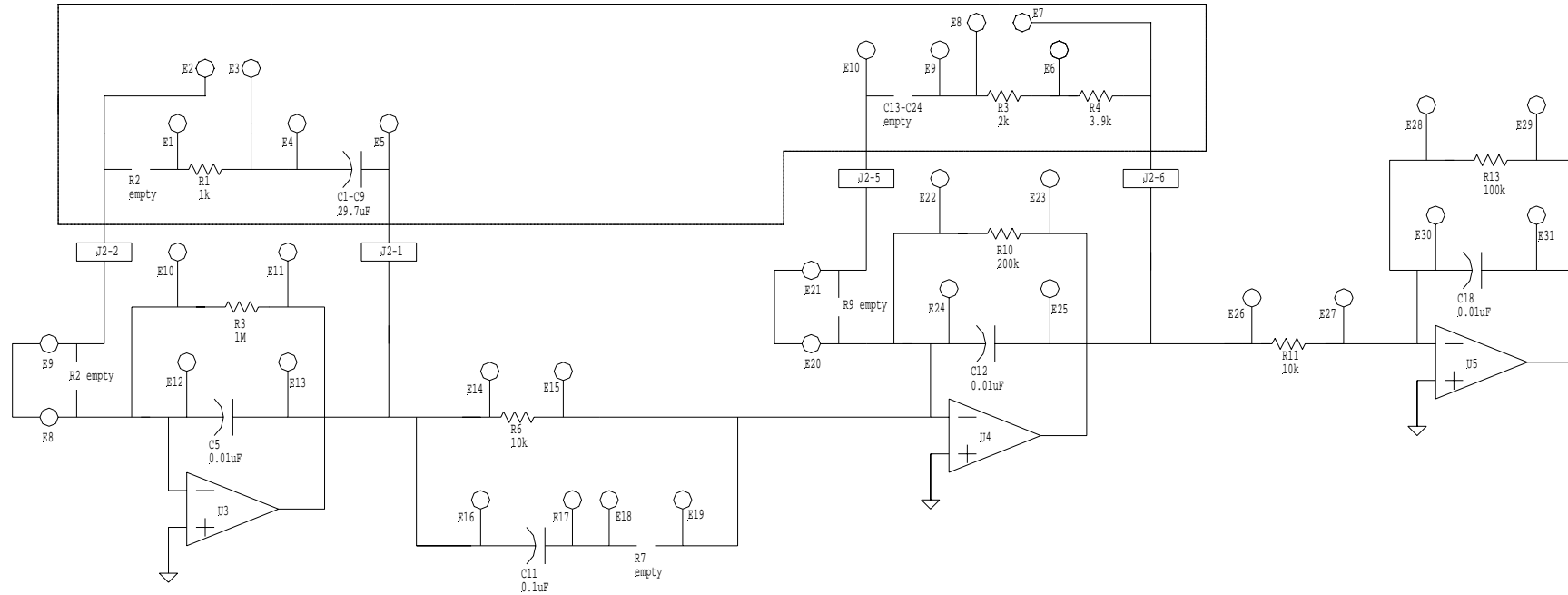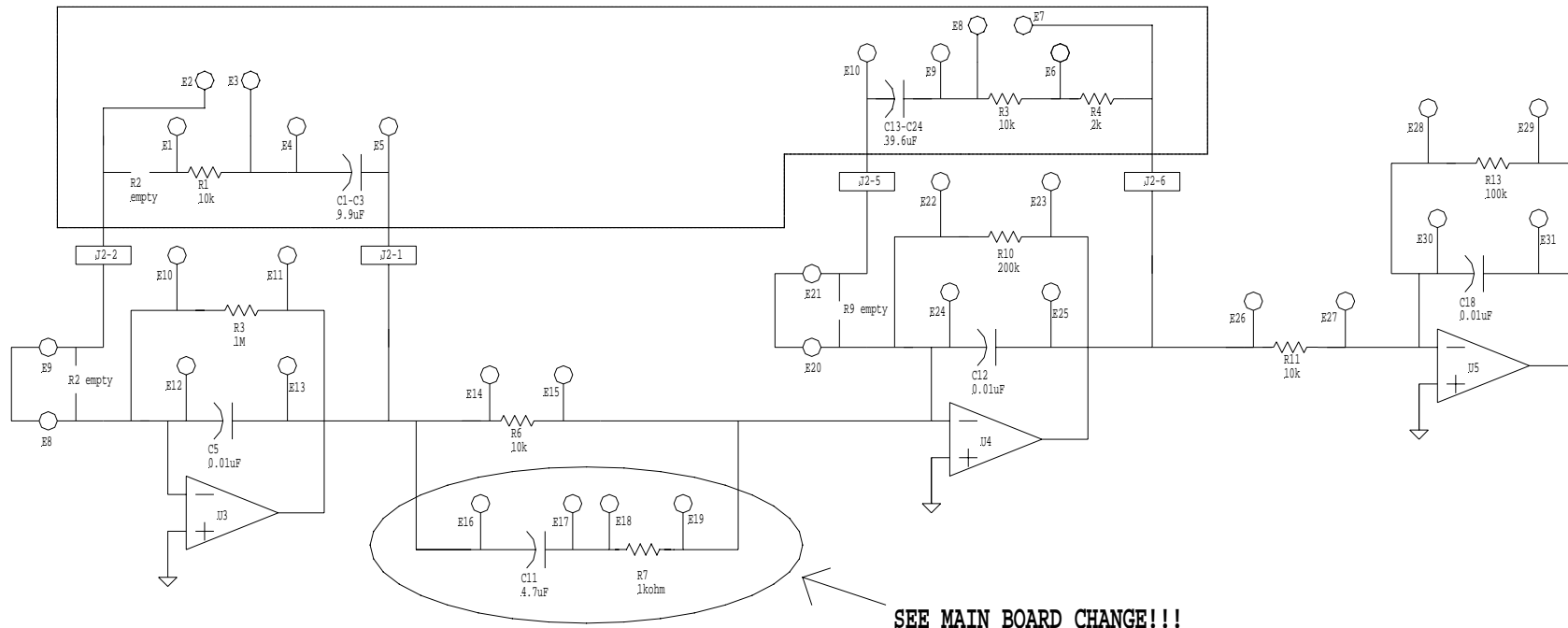**They are in a cabinet that looks like a Dynapower 600A p.s.**

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)

Resistive Load Jumper settings = E6-E7 in, E9-E10 in and E2-E3 in.
Inductive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.

Time Constant Board in dotted line

SPECIAL!!
USE NEW DOUBLE DECKER TIME CONSTANT BOARD

E2 E3
E1 E4 E5
R2 empty R1 .3K C1-C12 stacked 3 high 118.8uF

E8 E7
E10 E9 E6
C13-C24 empty R3 30k R4 3.9k

.510 ohm 1uF
E28 E29
R13 200k
E30 E31
C18 .01uF

J2-2 J2-1
E10 E11
R3 1M
E12 E13
C5 .01uF
J3

E9 R2 empty
E8

E14 E15
R6 10k

J2-5 J2-6
E22 E23
R10 200k
E21 E24 E25
R9 empty
E20 C12 .01uF

.12k 19.8uF
used 4-4.7uF and 1-1uF
E26 R11 39k E27

J4

J5

E16 E17 E18 E19
C11 2uF (2 105'S IN //) R7 1k

qtrim.skf
3/21/05

SEE MAIN BOARD CHANGES IN CIRCLES AND ELLIPSE!!!

23

TIME CONSTANT SHEET

BLUE and YELLOW tq power supplies

For ALL Service buildings

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
Resistive Load Jumper settings = E2-E3 in.
Inductive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.

Time Constant Board in dotted line

tq.skf
12/5/2001

TIME CONSTANT SHEET

YELLOW dh0 power supplies

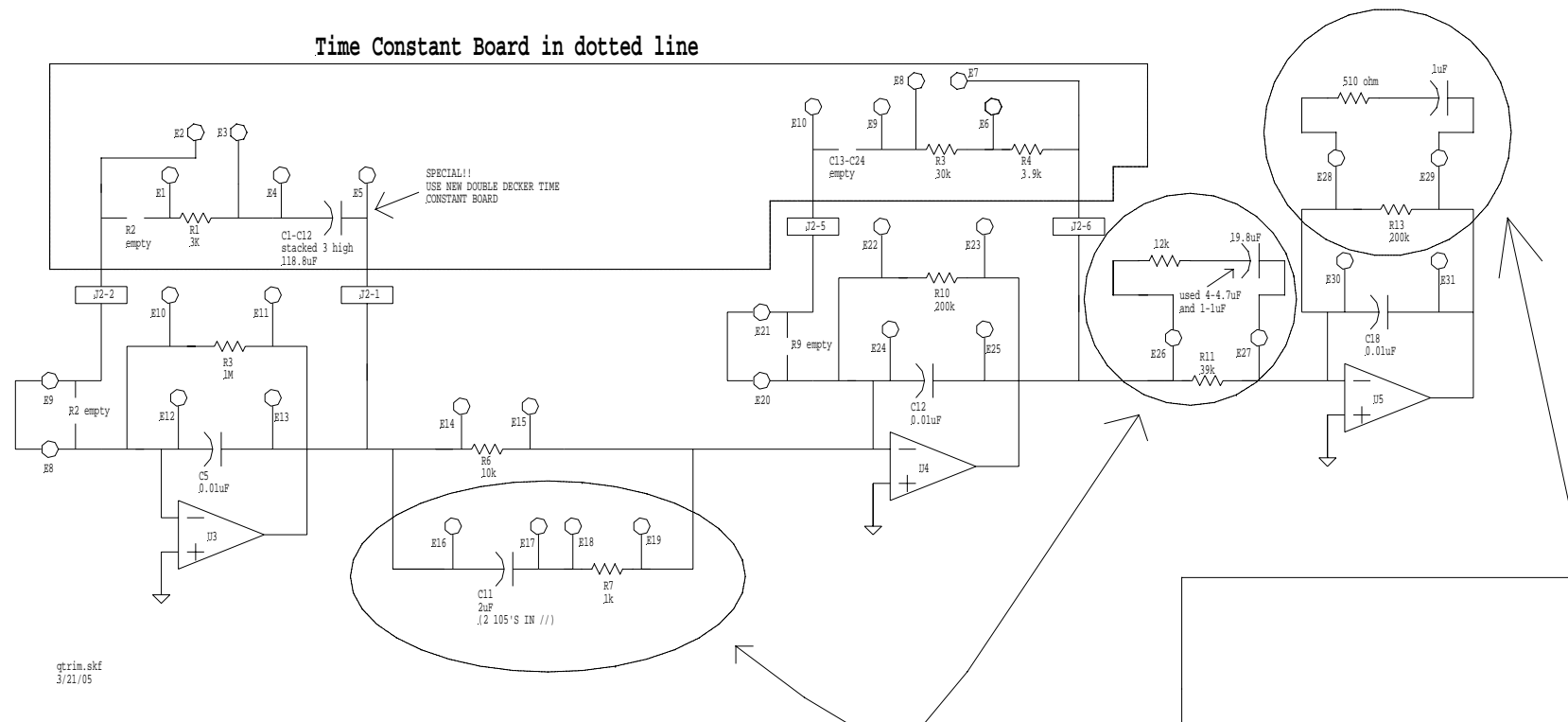**For Service buildings 1002B, 1004B, 1006B, 1008B and 1012A**

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
Resistive Load Jumper settings = E6-E7 in, and E9-E10 in and E2-E3 in.
Inductive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.

Time Constant Board in dotted line

ydh0except10A.skf
12/5/2001

TIME CONSTANT SHEET

YELLOW dh0 power supplies

For Service Building 1010A ONLY
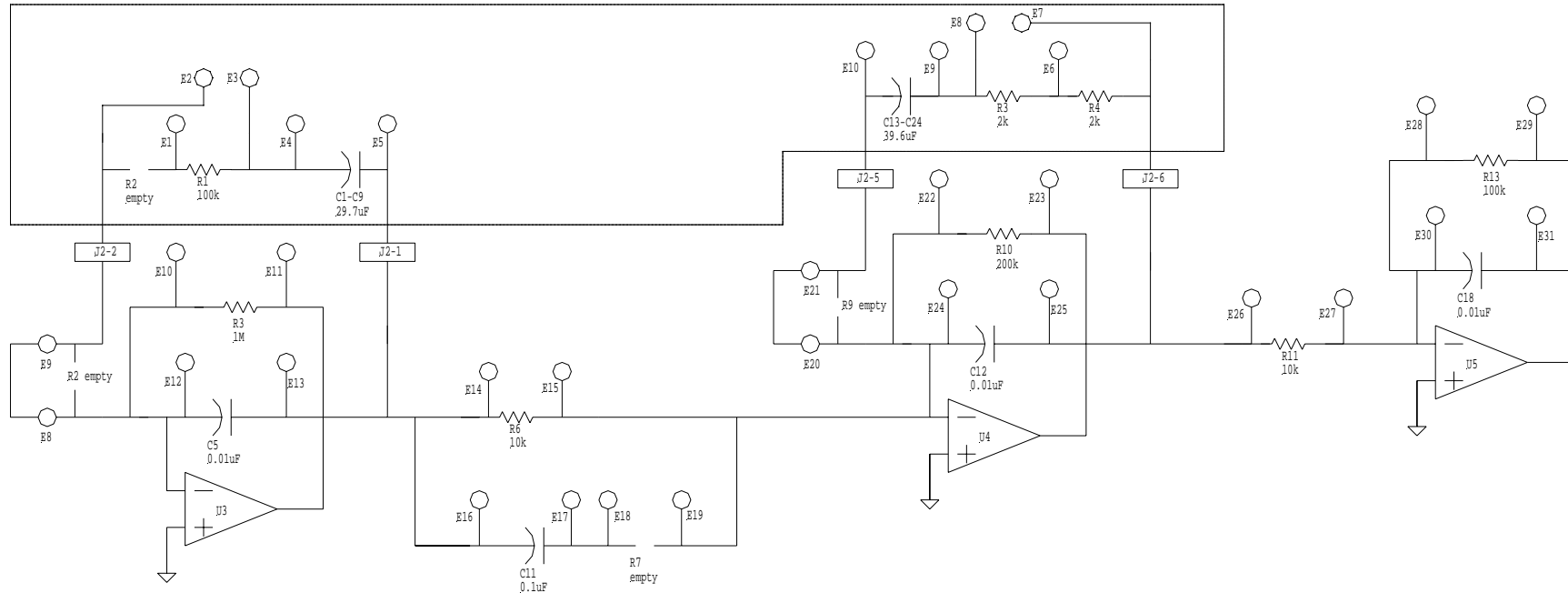
Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
Resistive Load Jumper settings = E6-E7 in, and E9-E10 in and E2-E3 in.
Inductive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.

Time Constant Board in dotted line

E2 E3

E8 E7

E10 E9 E6

E1 E4 E5

C13-C24 R3 R4
empty 50k 3.9k

E28 E29

R2 R1 C1-C9
empty 5k 29.7uF

J2-5 J2-6

R13
100k

J2-2 J2-1

E10 E11

E22 E23

E30 E31

R3
1M

R10
200k

E21

E12 E13

E9 empty

E26 E27

C18
0.01uF

E9

R2 empty

E24 E25

C5
0.01uF

E20

E14 E15

C12
0.01uF

R11
10k

JU5

E8

JU3

R6
10k

JU4

E16 E17 E18 E19

C11 R7
0.1uF empty

ydh0only10A.skf
12/5/2001

TIME CONSTANT SHEET

BLUE dhx power supplies

For Service buildings 1002B, 1004B, 1006B, 1008B and 1012A
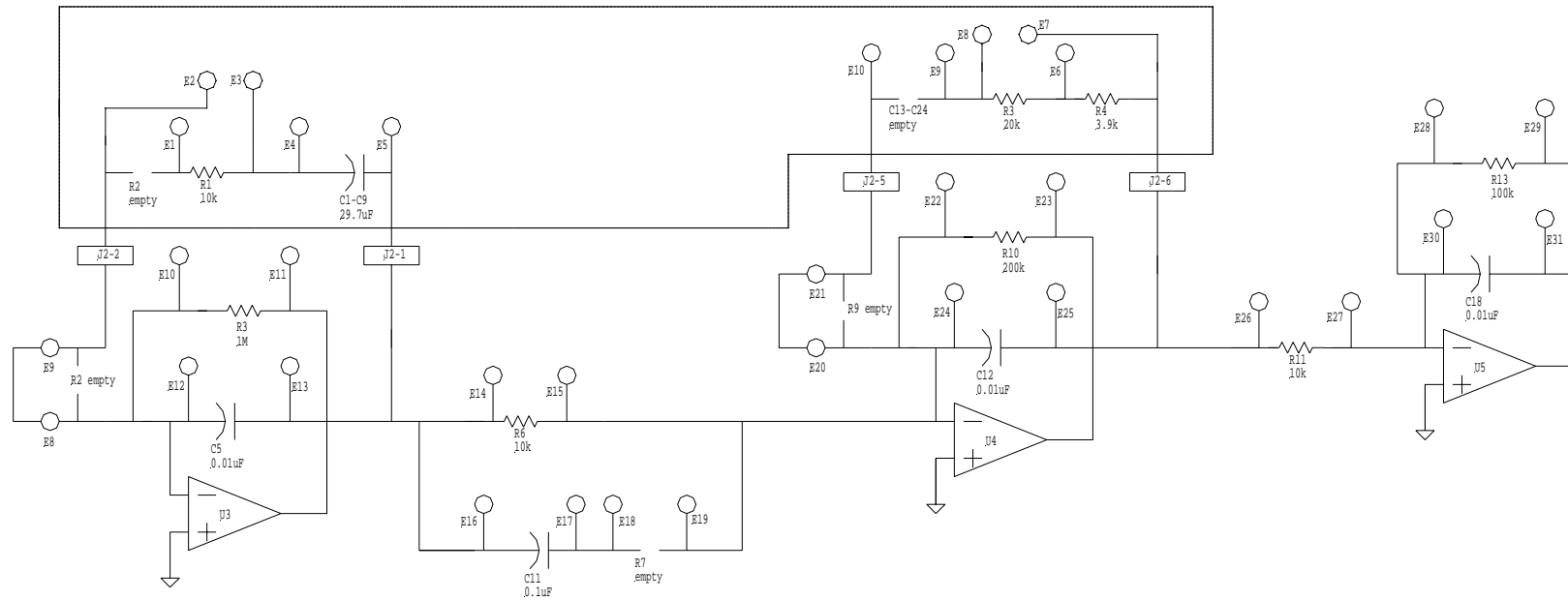
Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
Resistive Load Jumper settings = E6-E7 in, and E9-E10 in and E2-E3 in.
Inductive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.

Time Constant Board in dotted line

bdhxexcept10A.skf
12/5/2001

TIME CONSTANT SHEET

BLUE dhx and BLUE dh0 power supplies
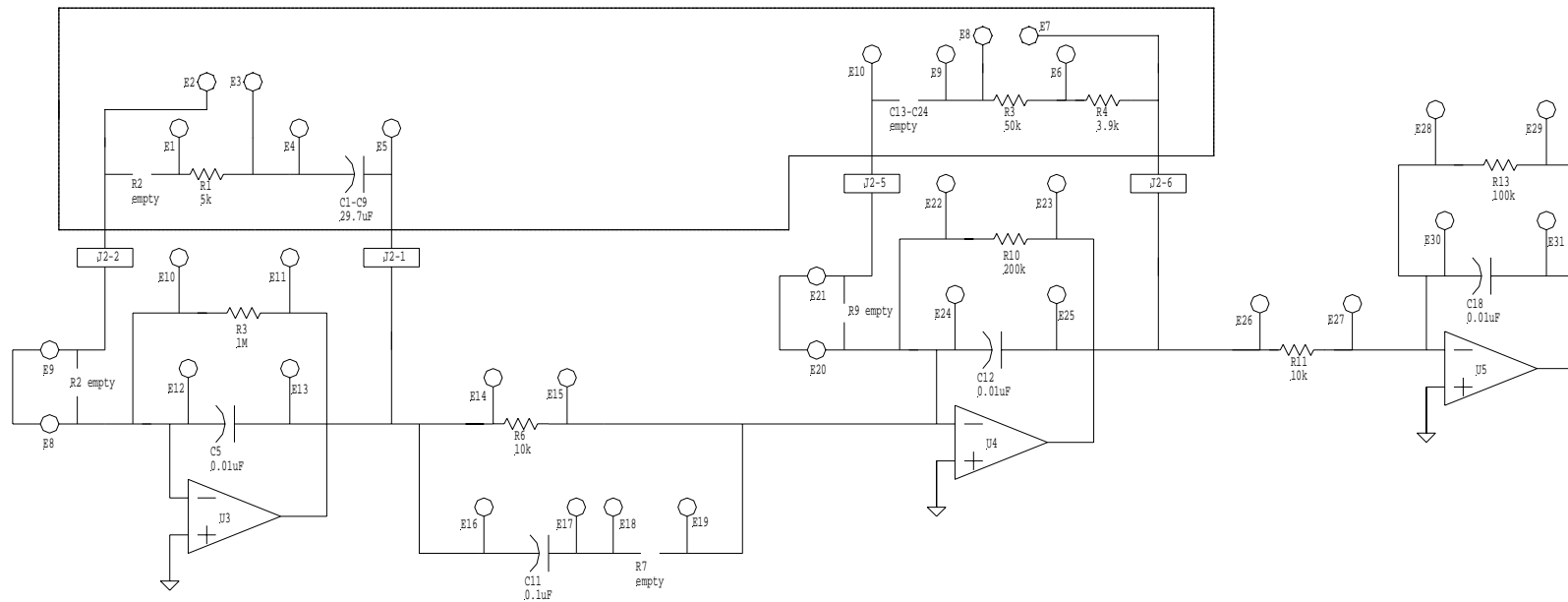
For Service building 1010A ONLY

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
Resistive Load Jumper settings = E6-E7 in, and E9-E10 in and E2-E3 in.
Inductive Load Jumper settings = E1-E2 in, E6-E7 in, and E9-E10 in.

Time Constant Board in dotted line

E2 E3

E1 R4 E5

R2
empty R1
10k C1-C9
29.7uF

E8 E7

E10 E9 E6

C13-C24 R3 R4
empty 20k 3.9k

E28 E29

R13
100k

E30 E31

C18
0.01uF

J2-5 J2-6

E22 E23

R10
200k

J2-2

E10 E11

R3
1M

E21

R9 empty

E24 E25

E26 E27

R11
10k

U5

J2-1

E9

R2 empty

E12 E13

C5
0.01uF

U3

E20

C12
0.01uF

U4

E14 E15

R6
10k

E8

E16 E17 E18 E19

C11
0.1uF R7
empty

bdh0bdhxonly10A.skf
12/5/2001

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TIME CONSTANT SHEET

BLUE dh0 power supplies

For Service buildings 1002B, 1004B, 1006B, 1008B and 1012A
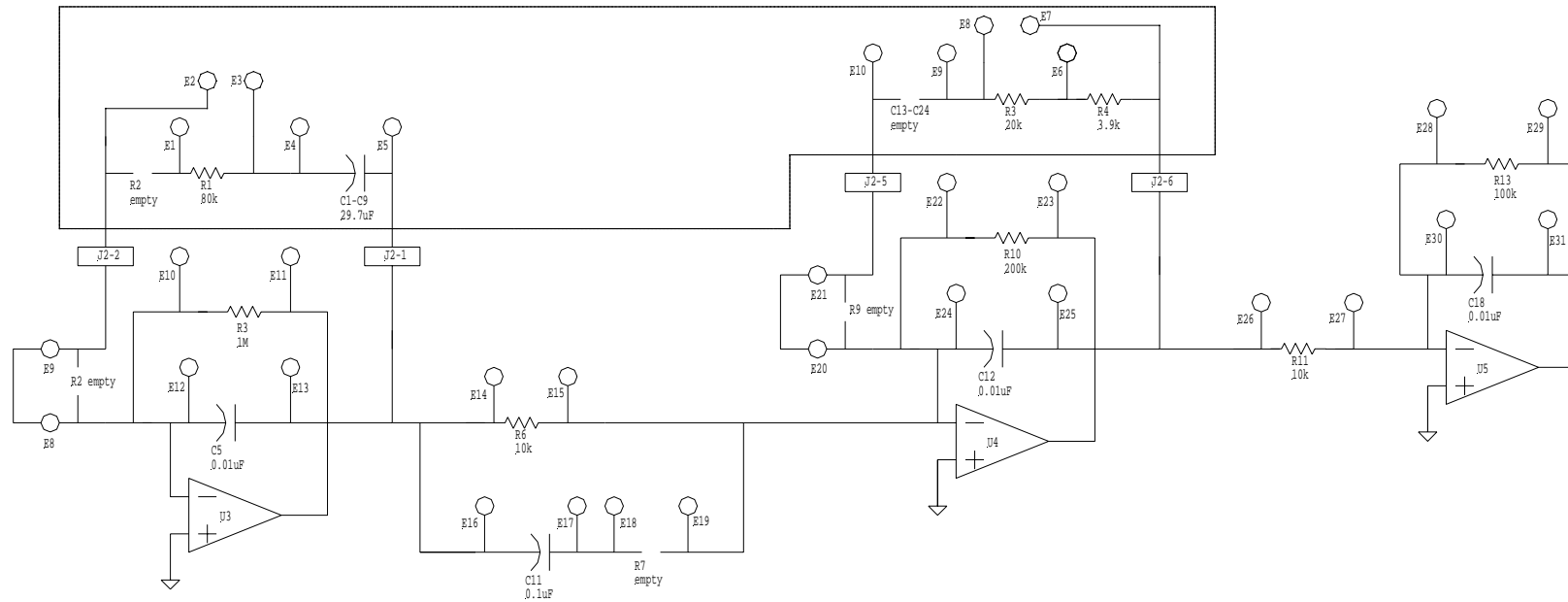
Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)

Resistive Load Jumper settings =
E6-E7 in, E9-E10 in, and E2-E3 in.
AND IF ABOVE DOESN'T WORK TRY THIS FOR RESISTIVE LOAD:
E6-E8 in (not E7),and E2-E3 in.
Inductive Load Jumper settings = E1-E2 in, E6-E7 in.

Time Constant Board in dotted line

bdh0except10A.skf
1/9/2002

C30 = 15uF
use three 4.7uF monolithic
capacitors in parallel

SEE MAIN BOARD CHANGES IN ELLIPSE!!!

TIME CONSTANT SHEET

BLUE and YELLOW qgt power supplies

For Gamma-T's in ALL Alcoves

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
Real Magnet Inductive Load Jumper settings = E1-E2 in, E6-E7 in
Resistive Load Jumper settings = see separate sheets

Time Constant Board in dotted line

Note: this was also used for magnet test in 902A

qgt.skf
12/5/2001

TIME CONSTANT SHEET

BLUE and YELLOW snk and rot power supplies

For Snakes and Rotators in ALL Alcoves
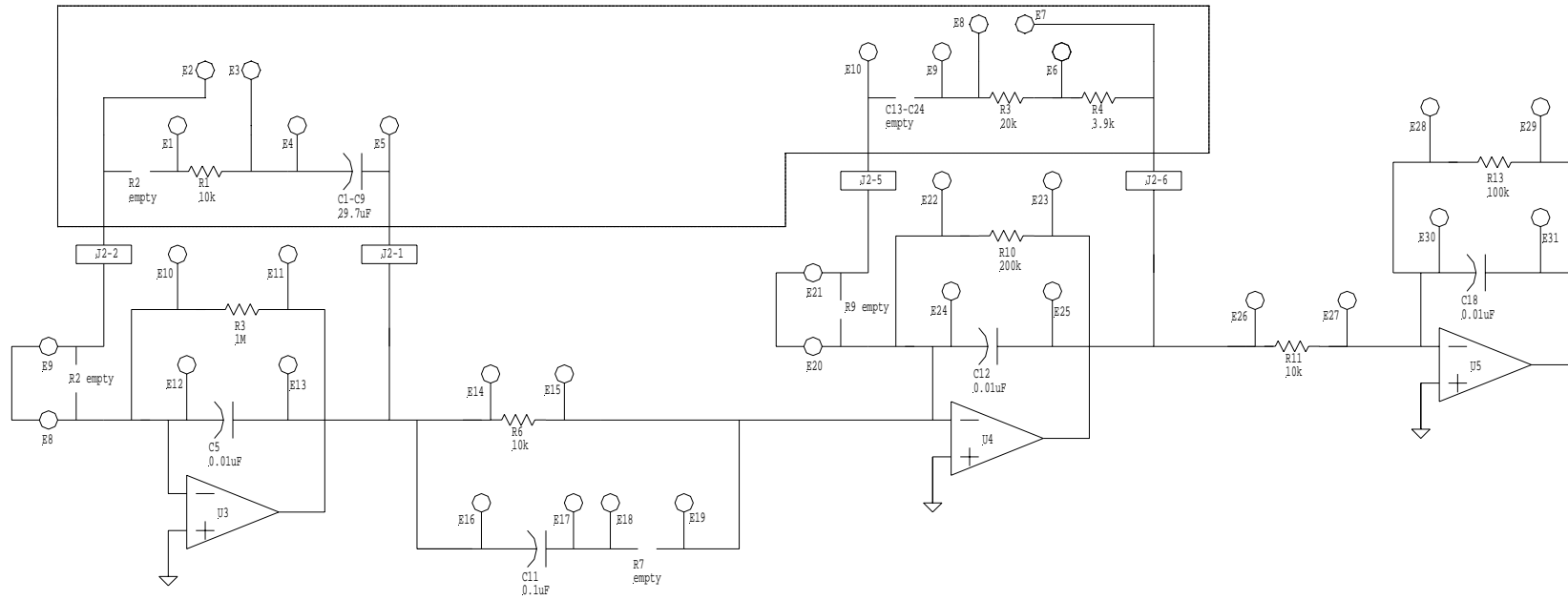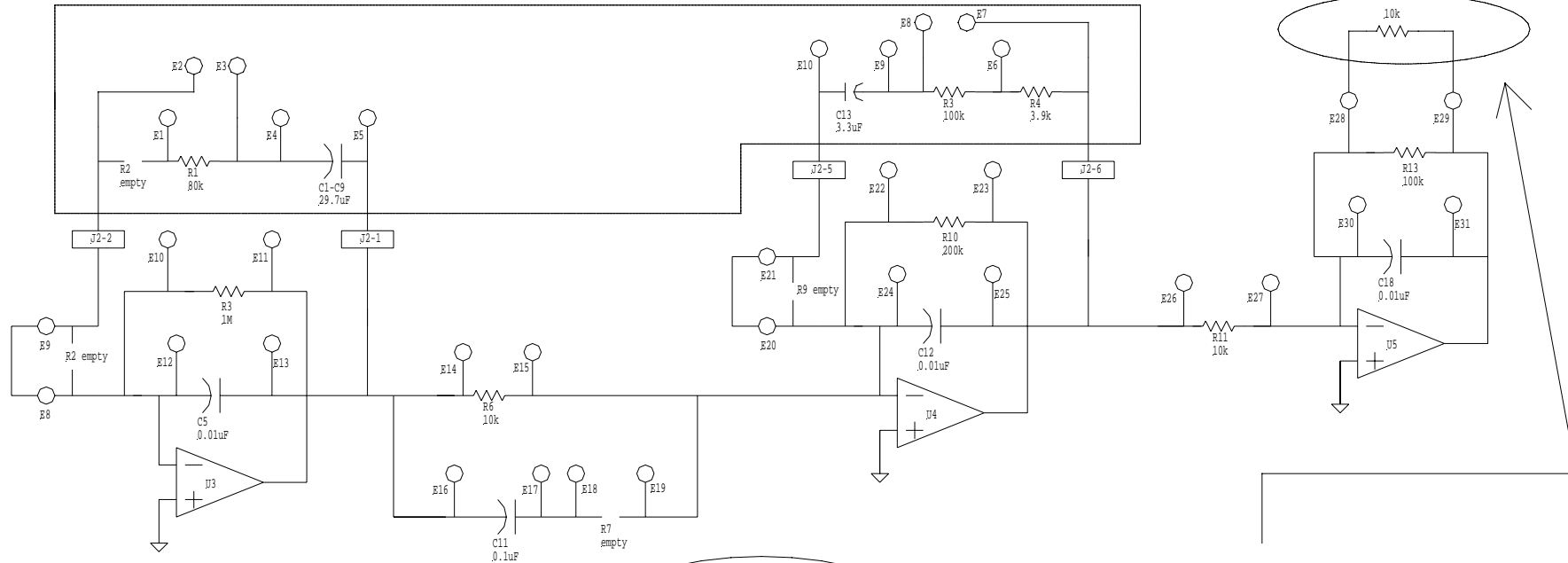**ERROR ADJUST = 0.75V**
ERROR DELAY = 1.67V

Magnet Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)

Inductive Load Jumper settings = E2-E3 in, E6-E7 in, and E9-E10 in
Resistive Load Jumper settings = see separate time constant sheet.

Time Constant Board in dotted line

SnakeSpin1.skf
3/21/05

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TIME CONSTANT SHEET---Inductive ONLY

AGS Cold Snake 50V 400A (Helical)

Sitewide name = A20-csnk-ps
This p.s. is in the A18 house

See simulation AGSColdSnakeHelicalx7x1x06.cir

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)

Resistive Load Jumper settings = see AGSColdSnakeHelical-RLoad-7x1x06.skf in R Load section
Inductive Load Jumper settings = E1-E2 in, E4-E5 in, E9-E10 in

This main board is
called a Type 10

Time Constant Board in dotted line

Add 10K

REMOVE C18

REMOVE C12
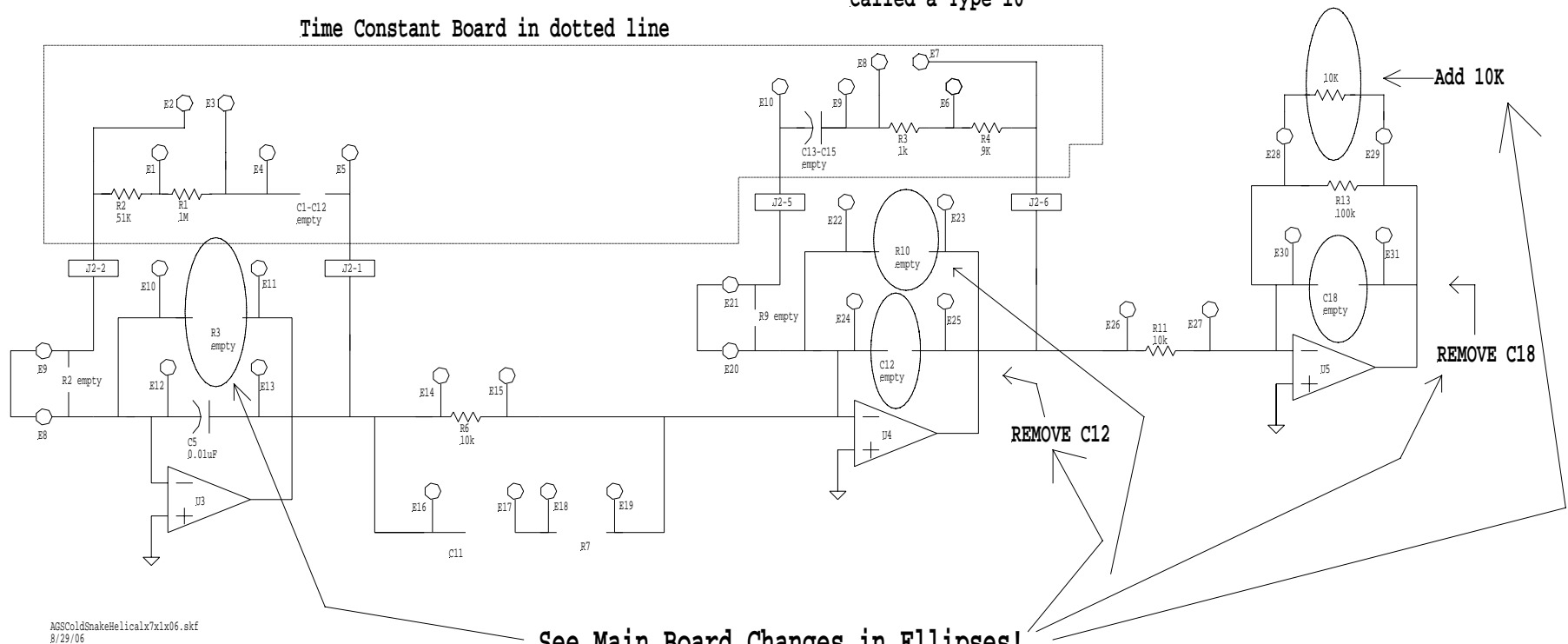
AGSColdSnakeHelicalx7x1x06.skf
8/29/06

See Main Board Changes in Ellipses!

TIME CONSTANT SHEET---Inductive ONLY

AGS Cold Snake 15V 440A (Solenoid)

Sitewide name = A20-sol-ps
This p.s. is in the A18 house

See simulation AGScoldSnakeSolenoid7-1-06.cir

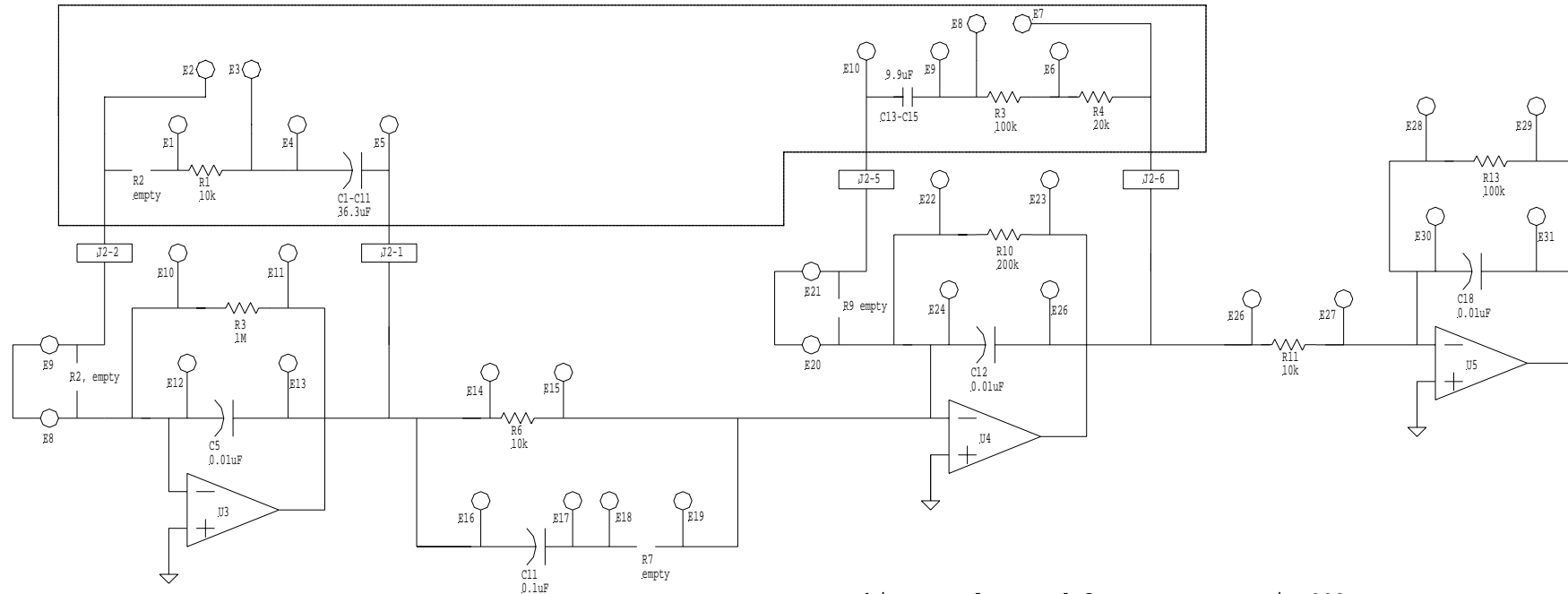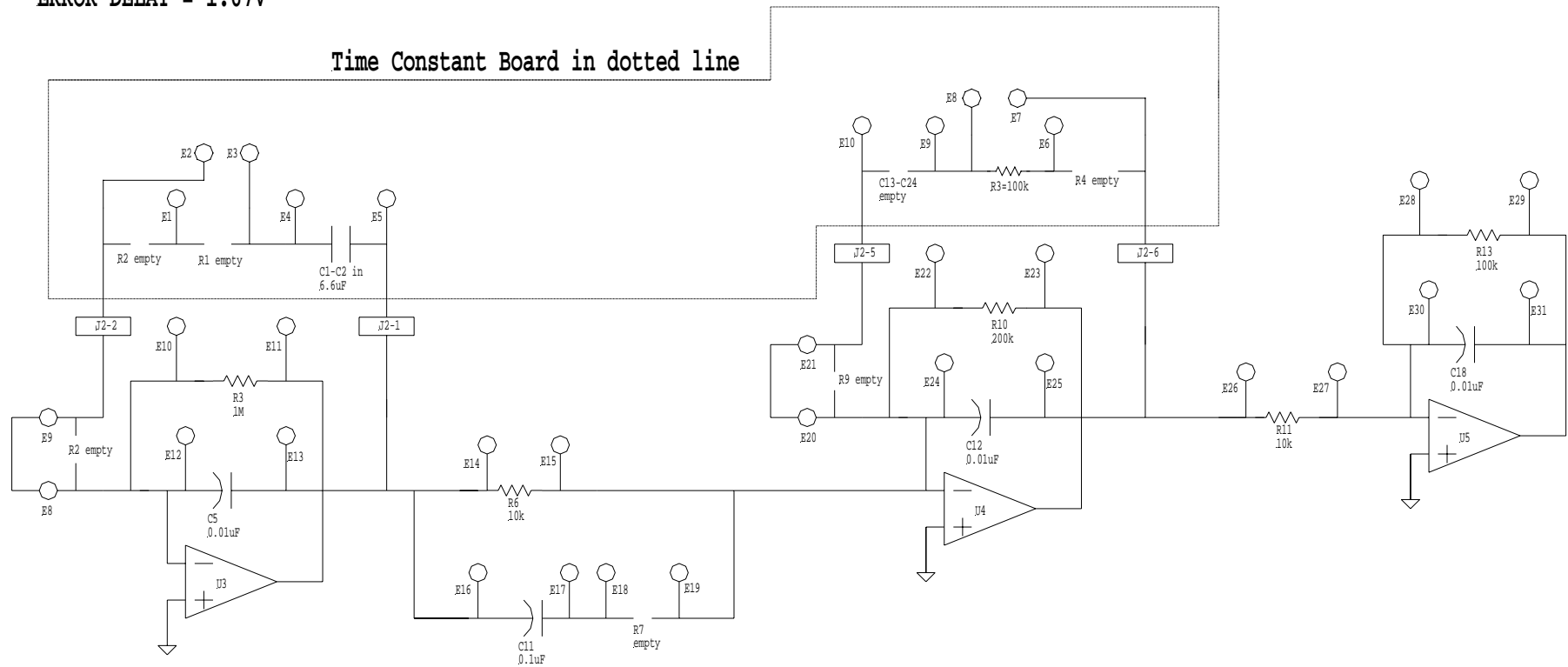**Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)**

Resistive Load Jumper settings = See R Load section
Inductive Load Jumper settings = E4-E5 in

**This main board
is a Type 10**

Time Constant Board in dotted line

Add 10K

REMOVE C18

REMOVE C12

See Main Board Changes in Ellipses!
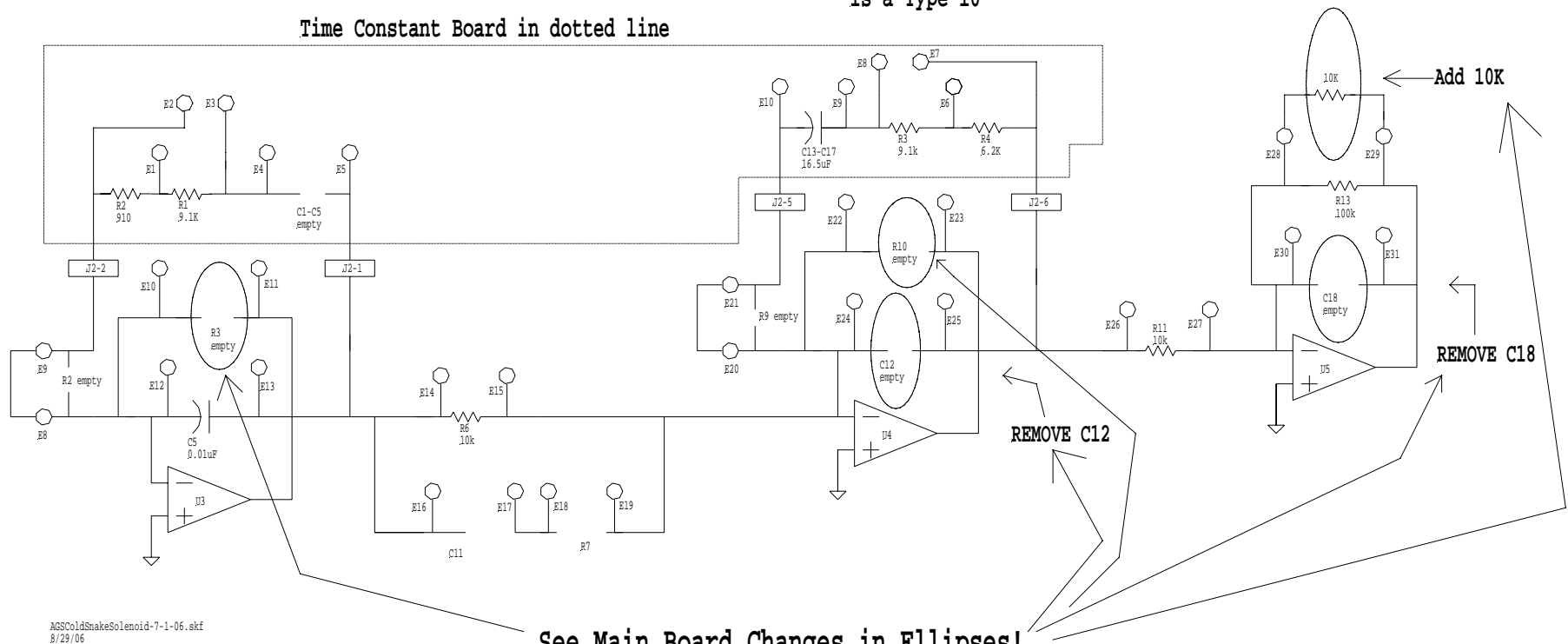
AGSColdSnakeSolenoid-7-1-06.skf
8/29/06

33

Other Special Resistive and Inductive Load Time Constants for Snakes, Spin Rotators, Gamma-T and q89/qd9 Power Supplies and AGS Cold Snake Power Supplies

This was used for the shorted 250mcm load
and also for the shorted 535mcm load in the tunnel.

TIME CONSTANT SHEET

BLUE and YELLOW snk and rot power supplies

For Resistive Load->>>>   R LOAD 1

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
Resistive Load (250mcm or 535mcm) Jumper settings =
E1-E4 in.

Inductive Load Jumper settings = see separate sheet

Time Constant Board in dotted line

set to 5.6k
for 535 load

10k pot

E2 E3
E1   E4   E5
R2   R1
empty empty
C1-C2
6.6uF

E8   E7
E10 E9   E6
C13-C24 R3   R4
empty   empty empty

J2-5
J2-6
E22 E23
R10
200k
E21 E24 E25
R9 empty
E20
C12
.01uF

E28 E29
R13
100k
E30 E31
C18
.01uF

J2-2
E10   E11
R3
1M
E12   E13
C5
.01uF
JU3

E9
R2 empty
E8

J2-1

E14 E15
R6
10k
E16 E17 E18 E19
C11
.01uF R7
empty

JU4

E26 E27
R11
10k

JU5
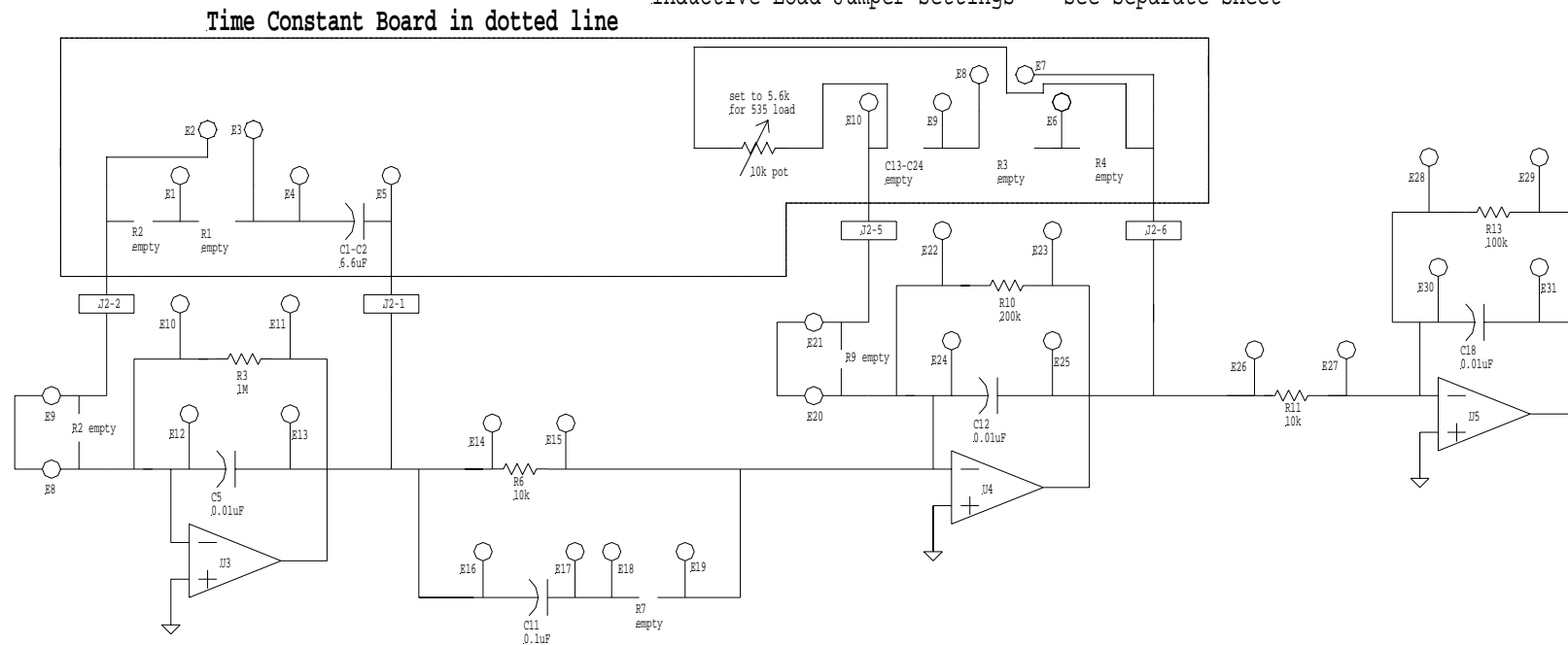
snk535mcmResLoad.skf
3/22/05

35

TIME CONSTANT SHEET

BLUE and YELLOW snk and rot power supplies

For Resistive Load: This has also been used
for testing in 7W->>>>>>>> | R Load 2 |

**This was used for 7W testing, shorted 250mcm load
and also for the shorted 535mcm load in the tunnel.**

**Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)**
Resistive Load (250mcm or 535mcm) Jumper settings =
E2-E3 in, E6-E7 in and E9-E10 in.

Inductive Load Jumper settings = see separate sheet

Time Constant Board in dotted line

E2 E3

E1   E4   E5

R2   R1   C1-C12
empty   empty   39.6uF

J2-2   J2-1

E10   E11

R3
1M

E12   E13

C5
.01uF

U3

E9
R2 empty

E8

E14   E15

R6
10k

E16   E17 E18   E19

C11
.01uF

R7
empty

E8   E7

E10   E9   E6

C13-C24   R3   R4
empty   10k   empty

J2-5   J2-6

E22   E23

R10
200k

E21
R9 empty   E24   E25

E20

C12
.01uF

U4

E26   E27

R11
10k

E28   E29

R13
100k

E30   E31

C18
0.01uF

U5

snkResistiveLoad2.skf
3/22/05

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TIME CONSTANT SHEET

qgt power supplies

For 58mH test load
and 45mH Load Mitch Built only

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
58mH Load Jumper settings = E1-E2 in, E6-E7 in, E9-E10 in
See other qgt TC sheets for Real Magnet Time Constant

Time Constant Board in dotted line

E2 E3

E7
R8

E1   E4   E5
E10   E9   E6

R2   R1   C1-C9
empty   10k   29.7uF

C13-C24   R3   R4
empty   20k   20k

E28   E29

R13
100k

J2-5   J2-6

E30   E31

J2-2   J2-1
E10   E11
E22   E23

R3
1M
R10
200k

E9
R2, empty   E12   E13
E21
R9 empty   E24   E26

E26   E27
C5
0.01uF
E8

E14   E15
E20
C12
0.01uF

R11
10k

C18
0.01uF

JJ3

R6
10k

JJ4

JJ5

E16   E17   E18   E19

C11
0.1uF
R7
empty
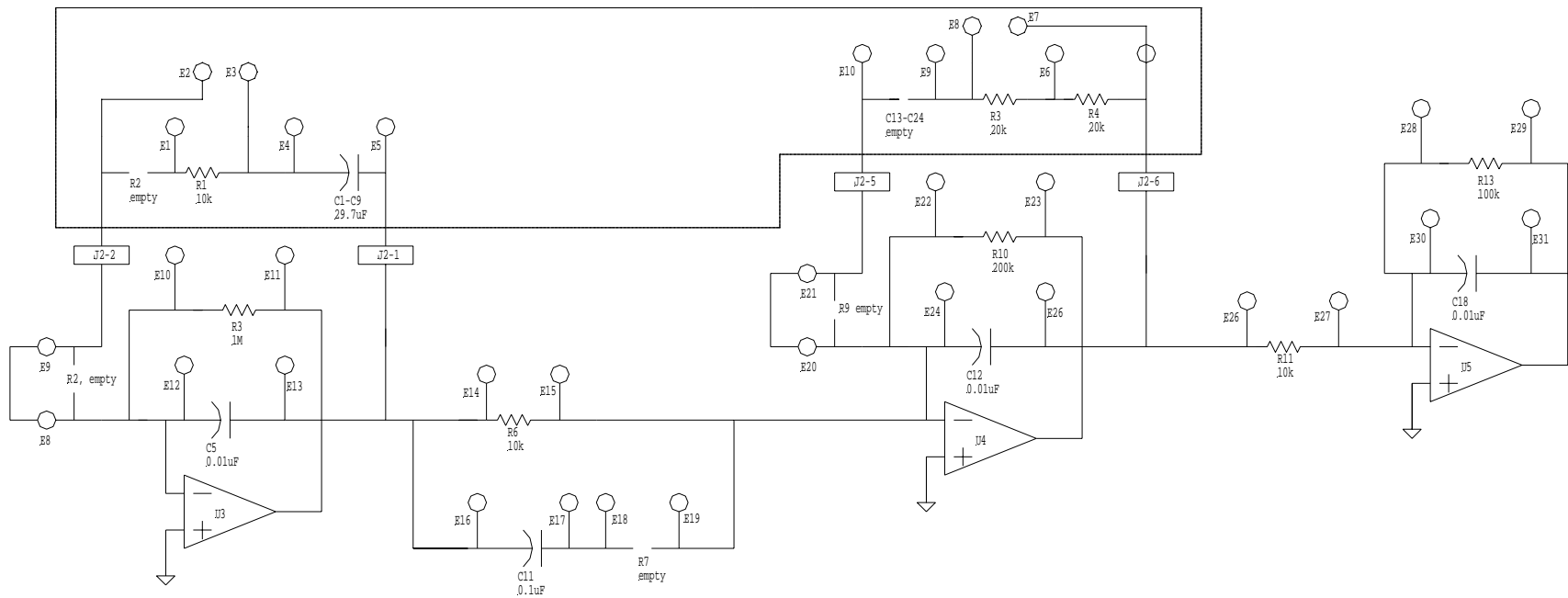
qgt58mH.skf
12/5/2001

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TIME CONSTANT SHEET
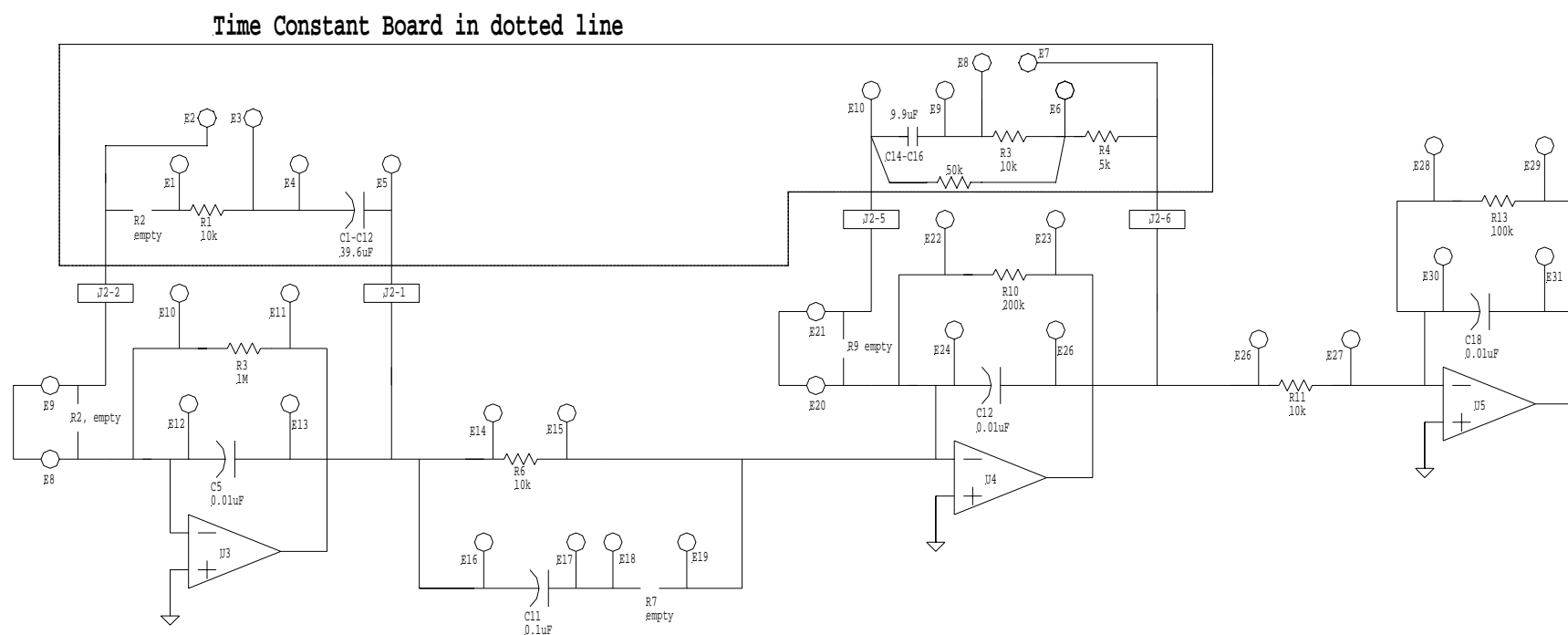
qgt power supplies

For different test loads

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
45mH, 35mH or 10 ohm Load Jumper settings = E1-E2 in, E6-E7 in
See other qgt TC sheets for Real Magnet Time Constant

Time Constant Board in dotted line

E2 E3

E8 E7

E1 E4 E5

E10 9.9uF E9 E6

C14-C16 R3 R4
10k 5k

R2 R1
empty 10k

50k

C1-C12
39.6uF

E28 E29

R13
100k

J2-2 J2-1

J2-5 J2-6

E30 E31

E10 E11

E22 E23

E21

R10
200k

C18
0.01uF

R3
1M

R9 empty

E9

E26 E27

E12 E13

E24 E26

R11
10k

R2, empty

E8

C5
0.01uF

E14 E15

C12
0.01uF

U5

E20

R6
10k

U4

U3

E16 E17 E18 E19

C11
0.1uF

R7
empty

qgt45mH35mH10ohm.skf
12/5/2001
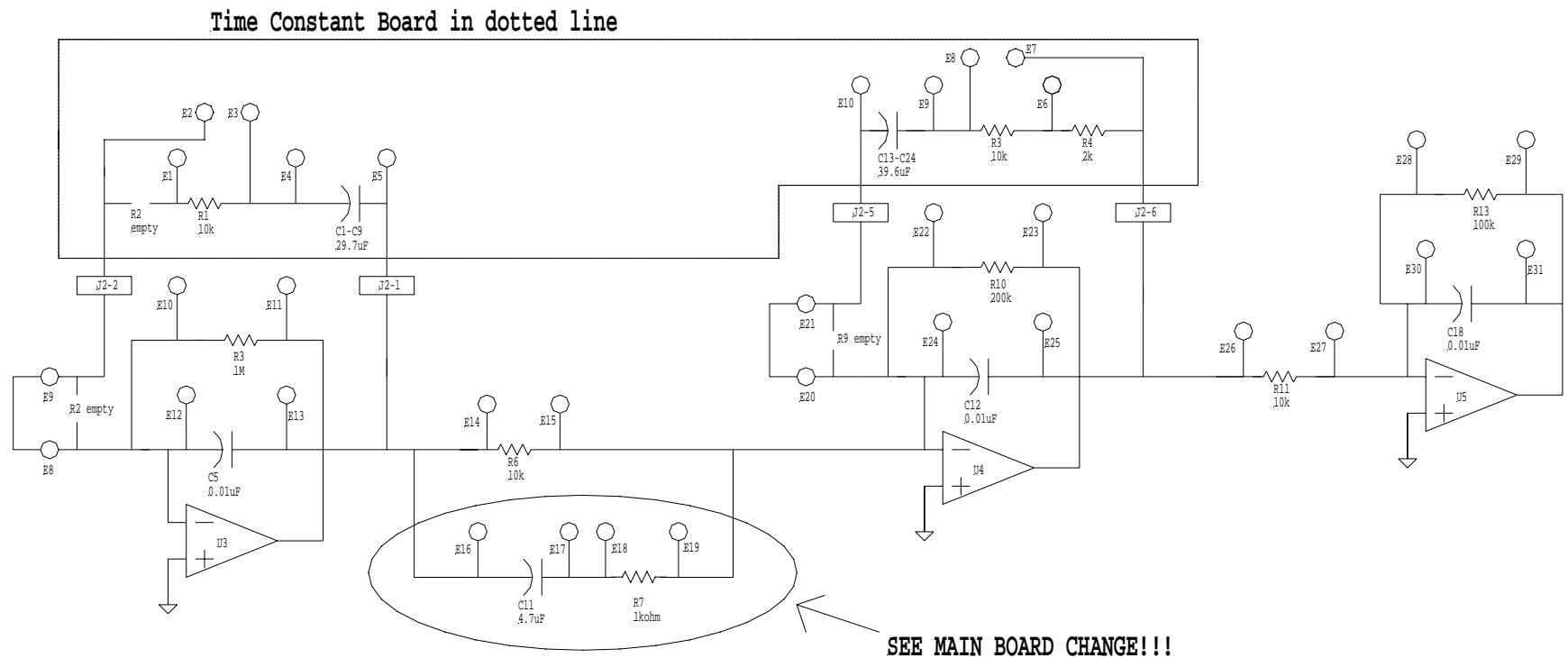
38

TIME CONSTANT SHEET

BLUE and YELLOW q89 & qd9 power supplies

FOR RESISTIVE LOAD ONLY

Time Constant Board Jumper Settings
(Little daughter board on top of Current Regulator Card)
Resistive Load Jumper settings = E1-E2 in and E7-E8 in.

Time Constant Board in dotted line

SEE MAIN BOARD CHANGE!!!

Allq89qd9x9x29x03ResistiveOnly.skf
9/29/03

39

TIME CONSTANT SHEET---Resistive ONLY for 535 mcm into AGS Tunnel

AGS Cold Snake 50V 400A (Helical)

Sitewide name = A20-csnk-ps
This p.s. is in the A18 house

Time Constant Board Jumper Settings
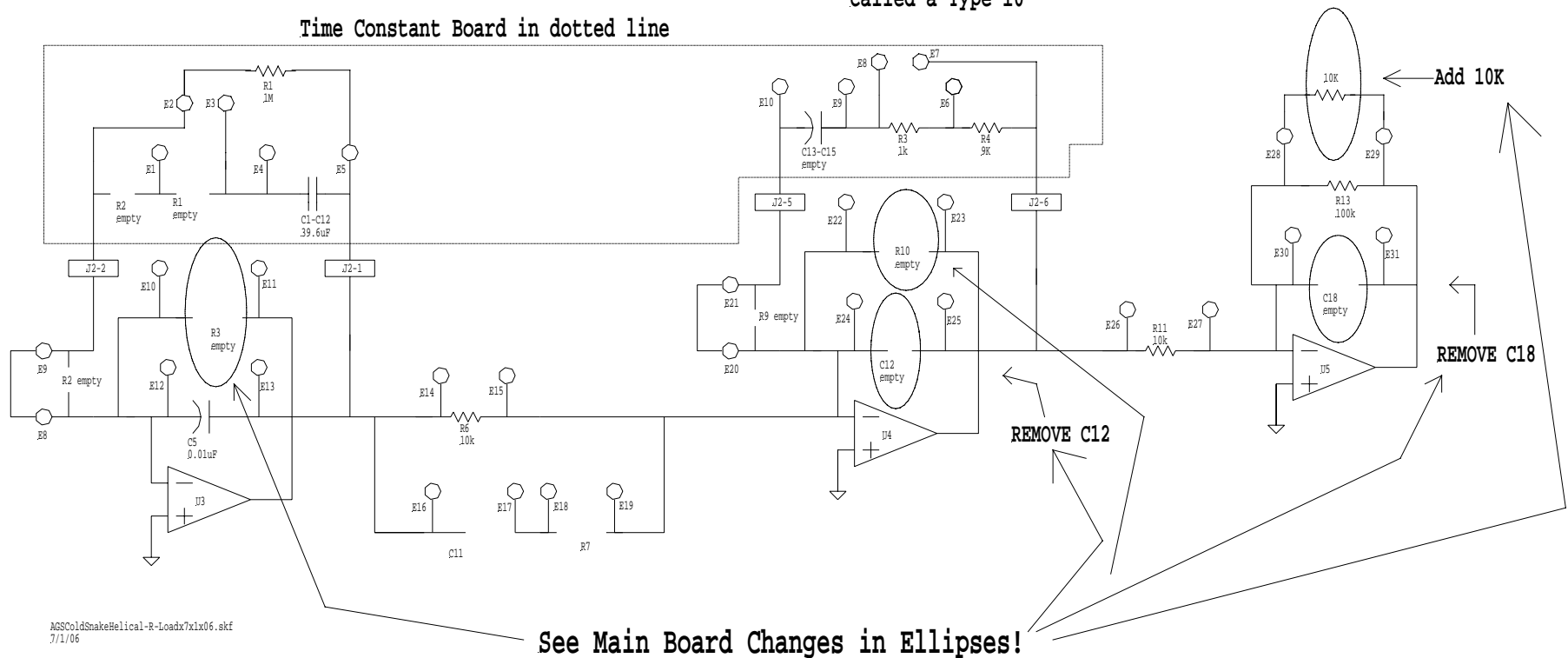**(Little daughter board on top of Current Regulator Card)**

Resistive Load Jumper settings = E2-E3 in, E9-E10 in
Inductive Load Jumper settings = See Inductive Load Section

This main board is
called a Type 10

Time Constant Board in dotted line

Add 10K

REMOVE C18

REMOVE C12

See Main Board Changes in Ellipses!

AGSColdSnakeHelical-R-Loadx7x1x06.skf
7/1/06

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TIME CONSTANT SHEET---Resistitive Load ONLY 535 mcm cable going into AGS Tunnel

AGS Cold Snake 15V 440A (Solenoid)

Sitewide name = A20-sol-ps
This p.s. is in the A18 house

Time Constant Board Jumper Settings
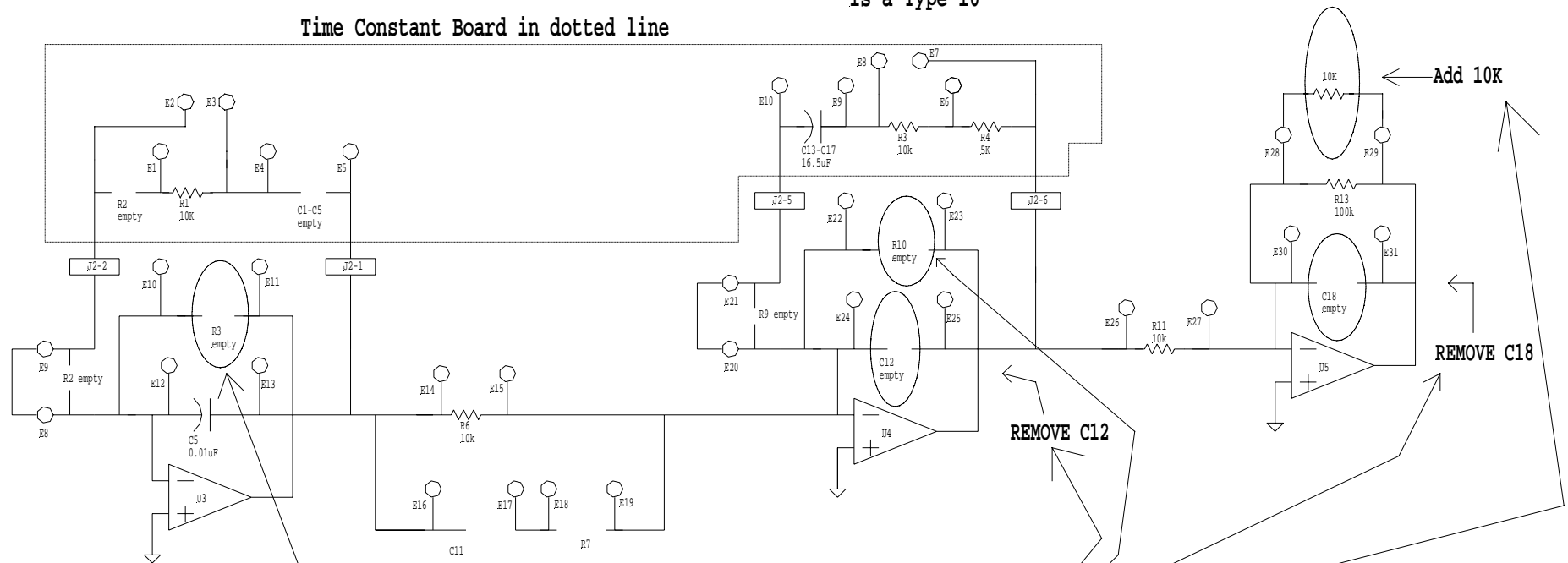**(Little daughter board on top of Current Regulator Card)**

Resistive Load Jumper settings = E1-E2 in, E4-E5 in, E7-E8 in
Inductive Load Jumper settings = See Inductive Load Section

This main board
**is a Type 10**

Time Constant Board in dotted line

Add 10K

REMOVE C18

REMOVE C12

See Main Board Changes in Ellipses!

AGSColdSnakeSolenoid-RLoad-7-1-06.skf
7/1/06

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Current Regulator Card Jumper Wire Modification Drawing (for all p.s.'s) and 3u Chassis Backplane Jumper Modification Drawing (for Dynapower p.s.'s only)

Note: The backplane modification drawing is provided for troubleshooting purposes only. This modification should be completed already. If however you find you cannot clear an error fault then one possible problem could be that the jumper wires on the backplane came off and this drawing will help you replace them. These jumpers should be installed ONLY if it is a Dynapower P.S.!!!

You should also be aware there are some new backplanes with 2 pin jumpers on the front labeled "Install for Dynapower p.s.'s Only". Just pull out all of the cards in the 3u chassis and look for these 2 pin jumpers (there are 2 – 2 pin jumpers next to each other). If you find them then the jumpers should be installed "For Dynapower p.s.'s only" on the front. If these jumpers do indeed exist on the front of the 3u chassis backplane then no jumpers have to be installed on the rear of the backplane.
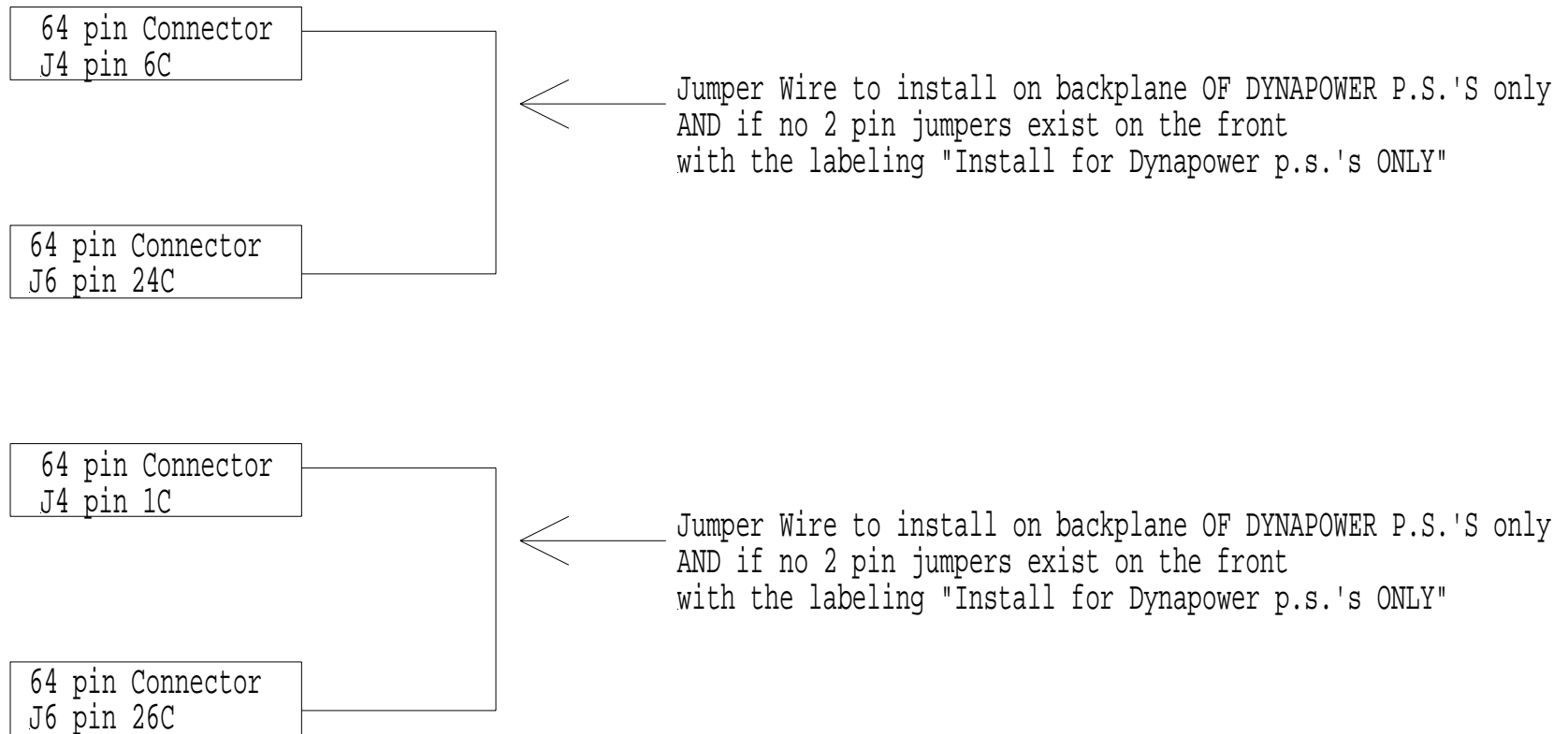
Handwritten notes:

jumper wire
to install → **26C**
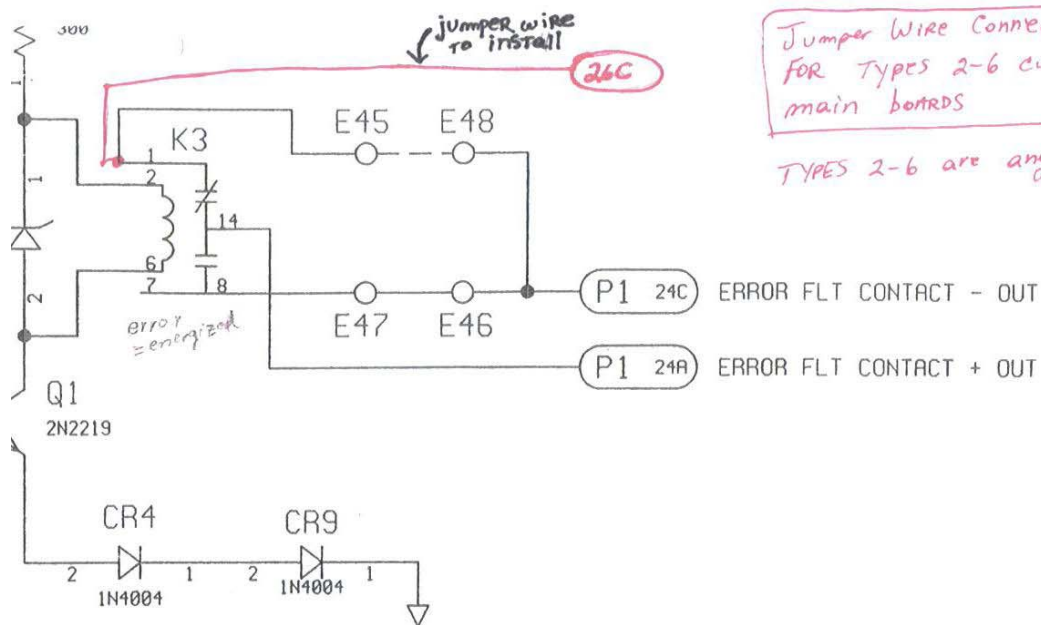
Jumper Wire Connection Sheet
For Types 2-6 current Regulator
main boards

TYPES 2-6 are any Dynapower P.S.
ONLY

Schematic labels:

300

K3

E45   E48

E47   E46

error
energized

Q1
2N2219

CR4   CR9
1N4004   1N4004

P1 24C   ERROR FLT CONTACT – OUT

P1 24A   ERROR FLT CONTACT + OUT

Title block:

	24069009	
	USED ON DRAWING NUMBER	NO. PER ASS'Y

BROOKHAVEN NATIONAL LABORATORY
ASSOCIATED UNIVERSITIES, INC.
UPTON, N.Y. 11973

RHIC

...RPRET IN GENERAL ...CORDANCE WITH ...E Y14.24M-1989			
...S OTHERWISE SPECIFIED	DRAWN BY	C. GUARINO	5-15-98
...SIONS ARE IN INCHES ...CIMAL TOLERANCES .X .06 .XX .02 .XXX .005 ...ULAR TOLERANCE ±1°	DESIGN APPROVAL		
	CHECKED BY		
	ENGINEER APPROVAL		
/ BREAK SHARP EDGES	SUPERVISOR APPROVAL		
MAX. MIN.	Q.A. APPROVAL		

TITLE: INSERTION QUADRUPOLE PWR.SUP.SYSTEM
CURRENT REGULATOR CARD
SCHEMATIC DIAGRAM

SIZE: E   DRAWING NUMBER: 24069007   REV. A

SCALE: NONE   WEIGHT: SHEET 1 OF 1

DWG NO 24069007   SHT 1 OF 1   REV A

A

IregJumperWire2.jpg

43

3u Chassis Backplane Modification For Dynapower P.S.'s ONLY

```
┌─────────────────────┐
│ 64 pin Connector    │
│ J4 pin 6C           │
└─────────────────────┘
```

Jumper Wire to install on backplane OF DYNAPOWER P.S.'S only
AND if no 2 pin jumpers exist on the front
with the labeling "Install for Dynapower p.s.'s ONLY"

```
┌─────────────────────┐
│ 64 pin Connector    │
│ J6 pin 24C          │
└─────────────────────┘
```

```
┌─────────────────────┐
│ 64 pin Connector    │
│ J4 pin 1C           │
└─────────────────────┘
```

Jumper Wire to install on backplane OF DYNAPOWER P.S.'S only
AND if no 2 pin jumpers exist on the front
with the labeling "Install for Dynapower p.s.'s ONLY"

```
┌─────────────────────┐
│ 64 pin Connector    │
│ J6 pin 26C          │
└─────────────────────┘
```

3uBackplaneModDynOnly1.skf